

User Guide

Version 3.6 - December 2015

CinePlex[®] Editor

A Component of the
CinePlex Behavioral Research System

|



Plexon Inc
6500 Greenville Avenue, Suite 700
Dallas, Texas 75206
USA



NOTE TO CINEPLEX V1 AND V2 USERS

The V3 version of CinePlex software is not compatible with hardware, software, or licensing for prior versions. **DO NOT ATTEMPT TO INSTALL V3 ON SYSTEMS RUNNING PRIOR VERSIONS.** It will not operate correctly, or possibly, not at all.



CAUTION Electrostatic Discharge

Some devices can be damaged by improper handling. Use appropriate electrostatic discharge (ESD) procedures when handling these devices. See <http://www.esda.org/> for additional information on ESD procedures.



CAUTION USB Security Key Damage

Before installing SafeNet® Sentinel™ security key drivers remove *all* Sentinel USB keys from the PC. If a system driver is installed with a USB key in the port, the key may become unusable.

CinePlex® Editor

A Component of the CinePlex Behavioral Research System
User Guide

Document Number: CPXMN0001d
Document Status: Standard
Version: 3.6
Date: December 2015

Copyright © 1983-2015 Plexon Inc. All rights reserved.

Plexon Inc Proprietary

The information contained herein is the property of Plexon Inc and it is proprietary and restricted solely to assist Plexon Inc customers. Neither this document nor the contents may be disclosed, copied, revealed or used in whole or in part for any other purpose without the prior written permission of Plexon Inc. This document must be returned upon request of Plexon Inc.

Information is subject to change without notice. Plexon Inc reserves the right to make changes in equipment design or components as progress in engineering or manufacturing may warrant.

PLEXON®, Plexon®, the five-line symbol, CereStage™, CineCorder™, CineLAB™, CineLyzer™, CinePartner™, CinePlex®, CineTracker™, CineTyper™, DigiAmp™, MiniDigi™, Offline Sorter™, OmniPlex®, PL2™, PlexBright®, PlexDrive™, PlexSort®, PlexStim™, Plextrode®, Radiant™, RapidGrid™, TrackSort® and the Plexon logo are trademarks of Plexon Inc, Dallas, Texas, USA. Other product and company names mentioned are trademarks of their respective owners.

Publication History

December 2015

This is the first release of the Version 3 of Plexon® CinePlex® Editor. It is based on Version 3.6 of the CinePlex Editor software, which provides these new features:

- The CinePlex Editor software can read PL2 files in addition to PLX files.
- The freezing detector allows the user to set parameters for freezing behavior detection and store the settings in the CPJ Project file.

Starting with CinePlex System Version 3.6 and in later versions, the CinePlex Editor and CinePlex Studio software each have their own independent, dedicated installers. This was done so that the user can easily install one application without the other, depending on the expected usage of the target computer. Both can be installed on the same computer if required according to the following:

- Install the CinePlex Studio software on computers where cameras are connected, or where existing video files are to be retracked, or otherwise reprocessed.
- Install the CinePlex Editor software on computers where offline processing of pre-recorded video and neural data files will be done.

Contents

Publication History

Chapter 1

Working with CinePlex Editor Files

- CinePlex Editor Features and Functions 2
 - Overview—Files Used by CinePlex Editor 2
 - Creating a Project File 2
 - Importing Data Files 2
 - Changing and Saving Project Files 3
 - Reopening Project Files 3
 - Exporting Files 3
-

Chapter 2

Getting Started with CinePlex Editor Projects

- Using the Quick Start Files 6
 - Setting Up a New Project 7
 - Understanding the CinePlex Editor Main View 9
 - Defining a New Marker 12
 - Creating Marker Occurrences 14
 - Saving and Exporting the Data 15
 - Re-opening a Project File 17
 - Using the Activity Window 17
 - Understanding Looping 18
 - Customizing the User Interface 18
-

Chapter 3

Markers and Marker Occurrences

- Overview 22
- Marker Types 22
- Defining Markers 24
- Inserting Marker Occurrences 25
- Editing Markers and Marker Occurrences 29
- Automatically Generating Marker Occurrences 31
- Operating with Marker Occurrences 34
- Selecting and Editing Marker Occurrences 39

Entering or Editing Coordinate Markers	40
Importing Markers	41
Exporting Markers to text or CSV files	41
Exporting Marker Occurrences Data as a PLX File	43
Exporting Marker Occurrences Data as a NEX File	44

Chapter 4

Using the Freezing Detector, Levels Editor and Zones Editor

Using the Freezing Detector	46
Using the Levels Editor	56
Using the Zones Editor	60

Chapter 5

CinePlex Editor Examples and Use Cases

Printing	64
Denoting Interesting Behavior In the Video	64
Invalidating Artifact Waveforms	65
Entering a Coordinates Marker to Track Animal Movement	67
Repairing Tracking Coordinates by Replacing Coordinates Marker	68
Simple Place Cell Analysis	69

Appendix A

CinePlex Editor User Interface

Overview	A-2
Main Window	A-3
Video Window	A-4
Activity Window	A-8
Markers Window	A-12
Input Window	A-16
Channels Window	A-17
File Info Window	A-18
Audio Output Window	A-20
Messages Window	A-21
Marker Occurrences Window	A-22
Scalar Window	A-24
Menus	A-27
File Menu	A-27
Edit Menu	A-37
View Menu	A-42
Animate Menu	A-42
Looping Menu	A-43
Find Menu	A-45
Tools Menu	A-46
Window Menu	A-64
Run Menu	A-64
Help Menu	A-64
Toolbars	A-65
Standard Toolbar	A-65
Edit Toolbar	A-65
Views Toolbar	A-65
Animate Toolbar	A-65
Looping Toolbar	A-66
Find Toolbar	A-66

Tools Toolbar	A-66
How CinePlex Editor Creates Initial Project Files	A-67
Reading Video (AVI) Files	A-67
Reading Plexon (PLX) Files	A-67
Reading NeuroExplorer NEX Files	A-68
Reading Digital VideoTracker (DVT) Files	A-68
Non-Typical Initial File Creation	A-68
Marker Occurrences and the Marker Occurrences Window	A-70
Correcting for Video Latency with CinePlex System Version 2	A-72
Aligning Tracker Coordinates to Frames with CinePlex System Version 2	A-74
Interpreting Frame and Event Timestamps	A-77
Analyzing CinePlex Studio (Version 2) Data with NeuroExplorer	A-78

Appendix B

Navigating the Plexon User Interface

Plexon User Interface	B-2
Screen Elements	B-2
Menus	B-2
Toolbars	B-4
Windows	B-6
Standard Menu Items and Dialogs	B-10
Window Menu	B-10
Run Menu	B-12
Help Menu	B-12
Messages Window	B-16
Right-click Menus	B-17
Current Selections	B-17
Undo	B-17
Customization	B-17
Toolbars Customization	B-17
Commands Customization	B-18
Keyboard Customization	B-19
Run Menu Customization	B-20
Options Customization	B-22

Index

Chapter 1

Working with CinePlex Editor Files

1.1 CinePlex Editor Features and Functions	2
1.2 Overview—Files Used by CinePlex Editor	2
1.3 Creating a Project File	2
1.4 Importing Data Files	2
1.5 Changing and Saving Project Files	3
1.6 Reopening Project Files	3
1.7 Exporting Files.....	3

1 Working with CinePlex Editor Files

1.1 CinePlex Editor Features and Functions

Plexon® CinePlex® Editor is a component of the CinePlex Behavioral Research System (CinePlex System). For a complete list of CinePlex System features and functions, see *CinePlex Behavioral Research System User Guide Version 3*, available at www.plexon.com.

1.2 Overview—Files Used by CinePlex Editor

To use CinePlex Editor successfully, it is important to understand how CinePlex Editor works with files. The system performs processes such as importing data, editing information, saving a project, re-opening a project file, and exporting data. CinePlex Editor can work with single files, but it is typically used with a pair of data files recorded in the lab—a video file and a neural data file.

When you start the CinePlex Editor software for the first time, the system prompts you for a separate project file to store the project information. This CinePlex project (CPJ) file can include the following items:

- File references: locations and names of the neural data file and the video file
- Marker definitions, which includes the marker type, name, and any zone or level definitions as appropriate

Note: Markers are a type of indicator or identifier. Marker occurrences are placements of particular markers in a file. For more information on markers, see [Section 2.4, “Defining a New Marker” on page 12](#).

- Information for each marker occurrence

1.3 Creating a Project File

Normally the first step is to create a CinePlex project file. To create a project file you must specify the neural data file, which is usually either a PL2 (or PLX) file or a NEX file (although it can be a DVT file), and the associated AVI video file. The **New Project Wizard** can step through this process; see [Section 2.2, “Setting Up a New Project” on page 7](#). After these files are specified, their file names are stored in the CPJ file, and the initial import of data into the project begins.

Note: A CinePlex project file can accommodate only one pair of data files—usually a neural data file and a video file.

Note: PLX files are based on a legacy format that was produced with older versions of the Plexon OmniPlex System or the Plexon Multichannel Acquisition Processor (MAP) System.

1.4 Importing Data Files

During the initial import of the neural and video data into a project, CinePlex Editor creates markers and marker occurrences based on the contents of the neural data and video files. From the neural data file, CinePlex Editor translates any events (for example, Type 4 data from PL2 or PLX files) or appropriate NEX

variables (event, marker, or interval) into markers and marker occurrences. From the video file, CinePlex Editor creates a Frame marker and creates occurrences for the timestamps of each video frame. However, CinePlex Editor does not store neural data, continuous data, or the video frame images in the CPJ file.

1.5 Changing and Saving Project Files

After importing the marker information from the data files into CinePlex Editor and it is in the form of marker occurrences, you may edit, extend, or even delete the information; then you may save the changes to a CPJ file. When saving the CPJ file, CinePlex Editor also saves any new marker information that it creates into the CPJ file. Thus, when re-loading a CPJ file, the system completely restores the markers and marker occurrences that were present when the CPJ file was saved.

1.6 Reopening Project Files

When subsequently re-opening a CPJ file, CinePlex Editor gets the marker data exclusively from the CPJ file; it does not re-import the markers from the neural data or video files. However, CinePlex Editor does find the original neural data and video files on the hard drive, opens them and reads them to get the neural spike data, continuous data, and video images.

Note: Moving the files—If you move the original neural data or video files into the same folder on which the CPJ file resides, CinePlex Editor will find them automatically when it reopens the project file. If you move the original neural data or video files to some other location on the hard drive, the system prompts to locate the files when it reopens the project file.

1.7 Exporting Files

Although CPJ files cannot currently be used by any software other than CinePlex Editor, you may export all of the data stored in CPJ files into other formats, such as PLX or NEX data files, text files or comma-separated-values (CSV) files. Text and CSV files can be opened in applications such as Excel[®] or MATLAB[®] for additional analysis.

Chapter 2

Getting Started with CinePlex Editor Projects

2.1 Using the Quick Start Files	6
2.2 Setting Up a New Project	7
2.3 Understanding the CinePlex Editor Main View	9
2.4 Defining a New Marker	12
2.5 Creating Marker Occurrences	14
2.6 Saving and Exporting the Data	15
2.7 Re-opening a Project File	17
2.8 Using the Activity Window	17
2.9 Understanding Looping	18
2.10 Customizing the User Interface	18

2 Getting Started with CinePlex Editor Projects

This chapter describes a quick-start example to provide familiarization with CinePlex[®] Editor.

2.1 Using the Quick Start Files

This quick-start example uses two sample data files that *do not install* with the CinePlex Editor software: CM_Quickstart.plx and CM_Quickstart.AVI. Because these two files are very large, they are located in the Quickstart folder on the USB drive that was delivered with your system. As an alternative, instead of using CM_Quickstart.plx and CM_Quickstart.AVI, you may use any video data file (AVI) collected with CinePlex Studio together with a neural data file (PL2 or PLX, NEX or DVT) collected by a Plexon[®] Multichannel Acquisition Processor (MAP) System or an OmniPlex[®] System. Before using the quick-start sample files, Plexon recommends copying them to the local disk on the computer to improve performance.

The quick-start example consists of the following series of procedures:

- [Section 2.2, “Setting Up a New Project” on page 7](#)
- [Section 2.3, “Understanding the CinePlex Editor Main View” on page 9](#)
- [Section 2.4, “Defining a New Marker” on page 12](#)
- [Section 2.5, “Creating Marker Occurrences” on page 14](#)
- [Section 2.6, “Saving and Exporting the Data” on page 15](#)
- [Section 2.7, “Re-opening a Project File” on page 17](#)

2.2 Setting Up a New Project

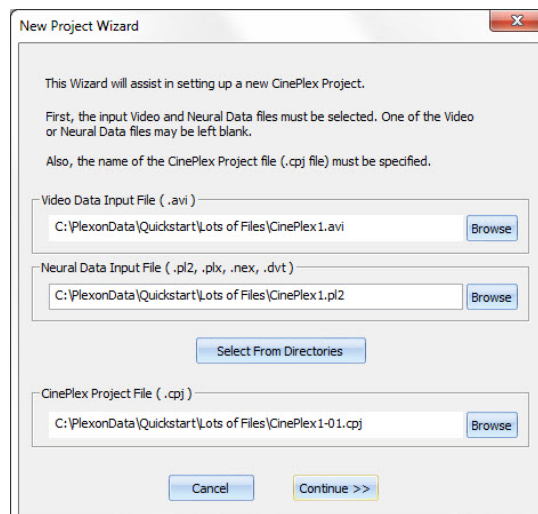
This procedure covers the steps required to set up a new project.

- 1 Click the CinePlex Editor desktop icon or click **CinePlex Editor** on the Windows[®] **Start** menu. The **Welcome To CinePlex Editor** dialog box opens.



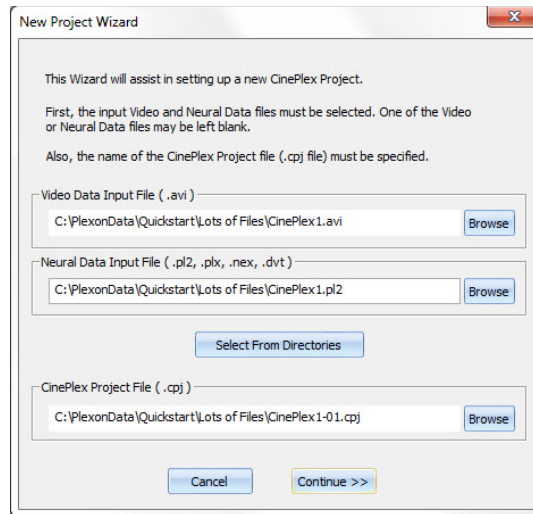
Note: The **Welcome to CinePlex Editor** dialog box provides a quick way to start a new project, load an existing project file, or load a recently-used project file. The first time the CinePlex Editor software runs, CPJ files do not appear in the list box and **Open the Selected Recent CinePlex Project** is unavailable.

- 2 Click **Start a New CinePlex Project**, which starts the **New Project Wizard**. This wizard is a series of dialog boxes that guide you through the process of setting up a new project. The **New Project Wizard** opens.



2 Getting Started with CinePlex Editor Projects

- 3 In the **Video Data Input File (.avi)** area, click **Browse**, go to the directory where the quick-start files are stored and locate CM_Quickstart.AVI. Open the file. The **New Project Wizard** changes all the file names to match.



When you enter a name in the **Video Data Input File (.avi)** box, the **Neural Data Input File (.pl2 or .plx)** and **CinePlex Project File (.cpj)** boxes automatically change to reflect the name entered.



HINT

Modify the neural data file name in the dialog box

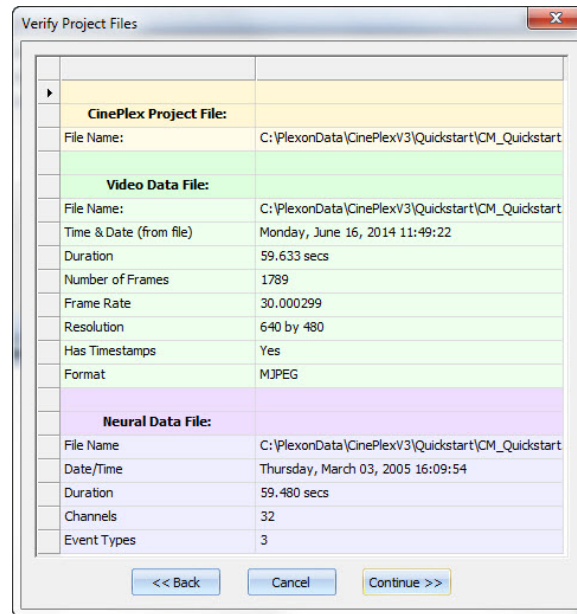
If you have files from multiple cameras, the video file name contains an underscore and a numeral, but the name of the neural data input file (PL2 or PLX) does not. (This is because the video files are camera dependent but the neural data file is not.) Change the name of the neural data input file as needed, or browse for the desired neural data file.

You may also change the name of the project file (CPJ) as desired.

Note: When using an AVI file and a DVT file, CinePlex Editor uses the timestamps from the DVT file. When using an AVI file and a PL2 (or PLX) file, the system uses the timestamps from the AVI file.

Note: For use with the CinePlex System, AVI files must be saved in Motion JPEG (MJPG) video compression format. If you attempt to open an AVI file that is not in MJPG format, a notification dialog box appears:

- 4 For this quick-start procedure, accept the suggested names and click **Continue**. The **Verify Project Files** dialog box opens, which contains some basic information to allow verification of the selected files.



- 5 If the file information is correct, click **Continue**.

The initial import operations begin; system creates the CPJ file and opens the CinePlex Editor main view.

2.3 Understanding the CinePlex Editor Main View

This procedure covers the steps required to set up and control the CinePlex Editor main view.

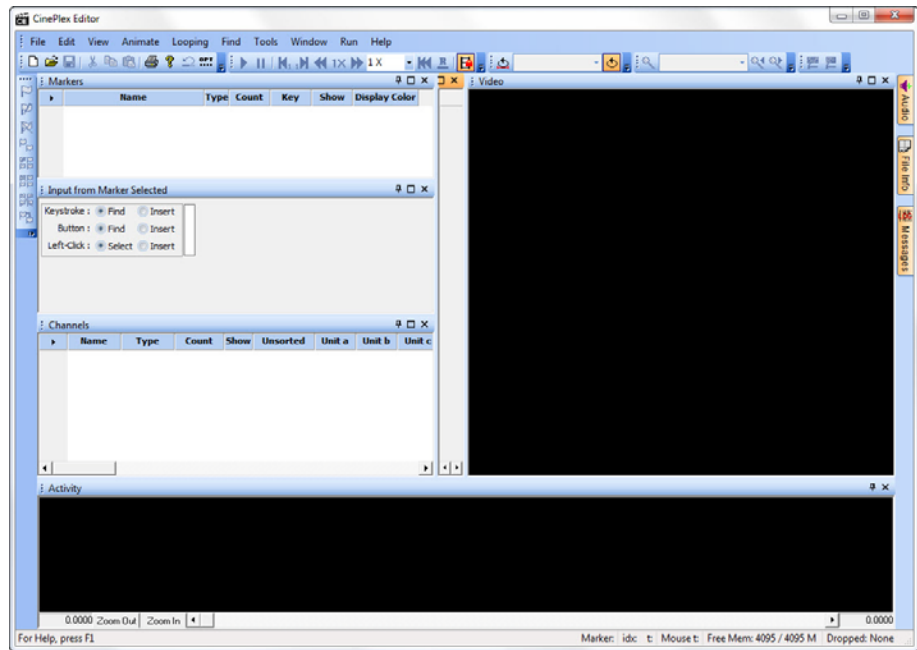
Viewing the CinePlex Editor main window

- 1 When the CinePlex Editor main view appears, click the maximize button in the Windows title bar to maximize the window.

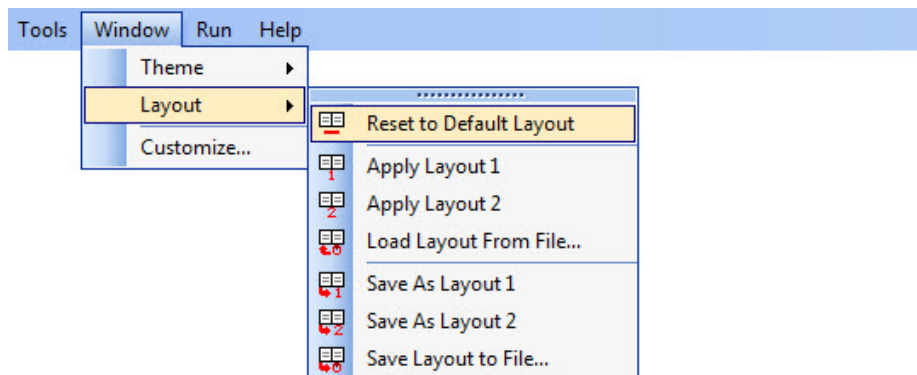
Note: CinePlex Editor is easier to set up and use when its screen area is maximized.

2 Getting Started with CinePlex Editor Projects

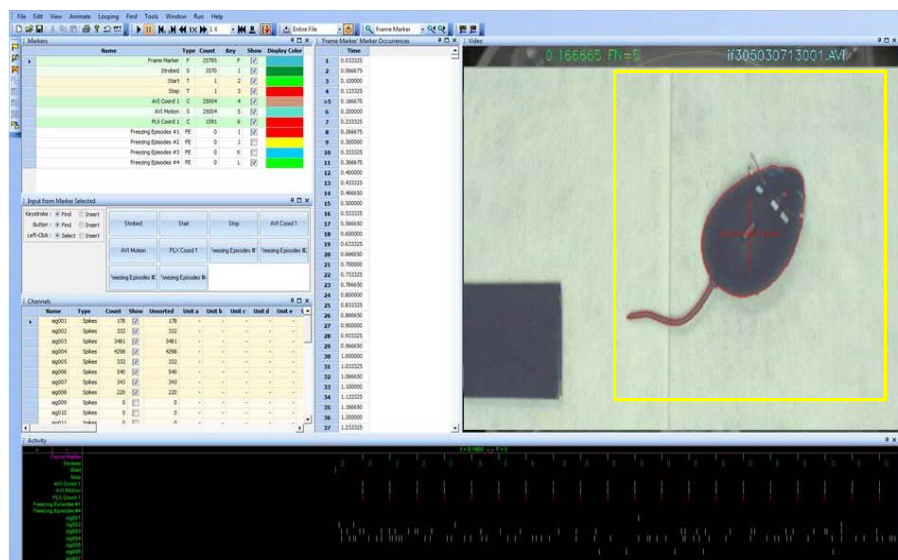
The CinePlex Editor main window should look similar to the following image:



You can reset the window arrangement to the default view by selecting **Window | Layout | Reset to Default Layout**.



The image below shows a typical main screen after some of the procedures in this chapter have been completed.



The first frame of the video file appears in the Video window at the upper-right. Because the CM_QuickStart neural and video data files were recorded using CinePlex Studio with the Tracking option enabled, CinePlex Editor imports the tracking coordinates from the neural data file, and they appear as crosshairs superimposed over the video.

The neural data appears in the Activity window at the bottom, which shows the neural activity at the beginning of the file. Each row in the Activity window represents either a marker or a channel of data. The marker occurrence times and neural firing times for each channel appear as tick marks in the view. You may color code the ticks as appropriate for the marker type and unit designation; for more information, see [Section 2.4, “Defining a New Marker”](#) on page 12.

The Activity window displays data for markers and channels. If the **Show** checkbox for a marker or channel is selected, the Activity window displays the marker or channel. If you deselect a checkbox, the associated marker or channel is not displayed in the Activity window.

Running the video

- 2 On the toolbar, click the **Play** button



The video plays, and the neural data scrolls from right to left in the Activity window. This keeps the current video frame at the position marked by the current-time indicator in the Activity window. The current-time indicator is the downward-pointing triangle near the center of the view, which is surrounded by the current frame time and frame number.

- 3 Click the **Pause** button to pause the display.



2 Getting Started with CinePlex Editor Projects

Note: You may also pause the display by pressing the SPACEBAR key. To restart the display click the **Pause** button or press the spacebar key.

- Click the **Previous Frame** and **Next Frame** buttons to move backwards or forwards to sequentially view each frame in the display.



Note: You may also step through the display by pressing the LEFT ARROW key or the RIGHT ARROW key.

- Click **Play**. Click the rate buttons (**Slower/Faster**) to decrease or increase the speed of the display. Continued decreasing the speed will eventually cause a reversal to occur, and continued increasing the speed will eventually reach a maximum speed.



Note: You may also change the speed by using the UP ARROW key and the DOWN ARROW key on the computer keyboard. You may also select a speed from the drop list on the toolbar.



- Click the **Reverse Animation** button to switch the direction of play. The speed of the new direction will be the same as in the old direction.



- Click the **Normal Speed** button to reset the playback speed to normal, which is one times the recorded speed of the video in the forward direction.



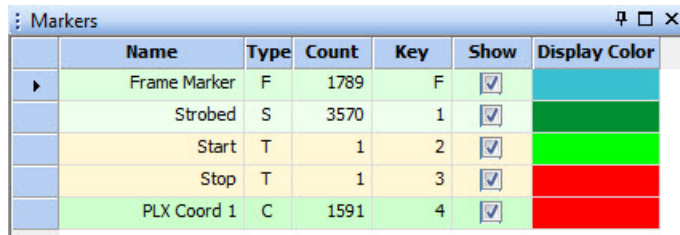
- Click the **Rewind** button to return to the beginning of the file.



2.4 Defining a New Marker

This procedure covers the steps required to define a new marker. The Markers window in the upper left corner of the main view shows the set of markers

imported from the data files. The triangular symbol in the left margin indicates the currently selected marker.



	Name	Type	Count	Key	Show	Display Color
▶	Frame Marker	F	1789	F	<input checked="" type="checkbox"/>	
	Strobed	S	3570	1	<input checked="" type="checkbox"/>	
	Start	T	1	2	<input checked="" type="checkbox"/>	
	Stop	T	1	3	<input checked="" type="checkbox"/>	
	PLX Coord 1	C	1591	4	<input checked="" type="checkbox"/>	

For the purpose of this quick-start example, suppose you want to use CinePlex Editor to invalidate intervals in the neural data that were corrupted by artifacts, in this case from the animal chewing. You do this by defining a marker to bracket the chewing interval as in the procedure below.

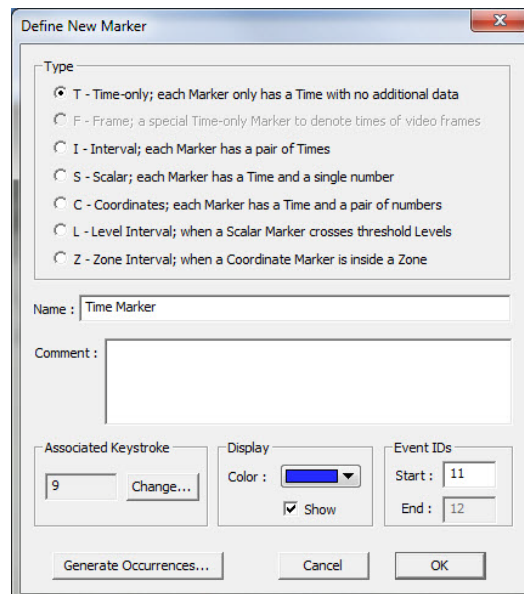
1 Click Pause.

Note: Although pausing is not required, the video can be distracting when performing other operations in CinePlex Editor.

2 Define a new marker to denote the time intervals that are dominated by artifacts. This can be done in three ways:

- Click the **New Marker** button,
- or, from the **Edit** menu, click **Define New Marker**,
- or, from the right-click menu in the **Markers** window, select **Define New Marker**.

The **Define New Marker** dialog box appears.



Define New Marker

Type

- ☒ T - Time-only; each Marker only has a Time with no additional data
- ☐ F - Frame; a special Time-only Marker to denote times of video frames
- ☐ I - Interval; each Marker has a pair of Times
- ☐ S - Scalar; each Marker has a Time and a single number
- ☐ C - Coordinates; each Marker has a Time and a pair of numbers
- ☐ L - Level Interval; when a Scalar Marker crosses threshold Levels
- ☐ Z - Zone Interval; when a Coordinate Marker is inside a Zone

Name : Time Marker

Comment :

Associated Keystroke : 9 Change...

Display : Color : ☒ Show

Event IDs : Start : 11 End : 12

Generate Occurrences... Cancel OK

Note: The **F** (Frame) marker is a special time-only marker applied automatically by CinePlex Studio to associate a time with each video frame. This marker always appears grayed out in the **Define New Marker** dialog box because it is system-generated.

2 Getting Started with CinePlex Editor Projects

- 3 In the **Type** area, click **I** to define an interval marker.
- 4 In the **Name** box, in the place of the default name Interval type “Chewing Artifact.” Retain the default settings for the other items.
- 5 Click **OK**.

The **Chewing Artifact** entry appears in the **Markers** window, and the triangular symbol appears in the left-most column to indicate that this marker is currently selected. However, there are no occurrences of this marker, so the value in the **Count** column is 0.

Note: [Section 3.3, “Defining Markers” on page 24](#), provides detailed information about the **Markers** window, the **Define New Marker** window, and types of Markers.

2.5 Creating Marker Occurrences

This procedure covers the steps required to create new marker occurrences. It is possible to have more than one occurrence (or many occurrences) for any given marker. You may manually enter marker occurrences in three different ways:

- keystroke
- button click in the Input window
- mouse click in an appropriate view

Each method has advantages and disadvantages; we suggest trying each method to find the appropriate one. For more information on each one of these methods, see the following sections:

- [Section 3.4, “Inserting Marker Occurrences” on page 25](#).
- [Section 5.4, “Entering a Coordinates Marker to Track Animal Movement” on page 67](#)
- [Section 5.5, “Repairing Tracking Coordinates by Replacing Coordinates Marker” on page 68](#)
- [Appendix A, CinePlex Editor User Interface](#)—See information about the Activity window, Markers window and the Edit Markers menu option.

This quick-start example covers only the keystroke method. In the previous procedure you defined the **Chewing Artifact** marker, which appears in the Markers window in the **Name** column and its associated key appears in the **Key** column as 5. If you press the **5** key, CinePlex Editor expects an operation with the **Chewing Artifact** marker.

The available marker operations appear in the Input window, which normally opens directly beneath the Markers window. The **Keystroke** radio buttons define the operations associated with pressing keys. The default selection is **Find**. If you press the **5** key, CinePlex Editor finds the next occurrence of the Chewing Artifact marker. However, because no occurrences of the Chewing Artifact marker have been created, the 5 key currently has no effect. To create marker occurrences follow the procedure below.

- 1 In the Markers window, select the **Chewing Artifact** marker.
- 2 To arm CinePlex Editor to insert new marker occurrences when pressing the **5** key, in the Input window at **Keystroke**, click **Insert**.
- 3 Click **Play**, or press the `SPACEBAR` key.
- 4 Although interval markers are easier to insert while CinePlex Editor is playing, the default 1X playback speed can be too fast to insert markers precisely. Adjust the playback speed by selecting a slower setting from the speed droplist on the toolbar, for example, **1/8X**.
- 5 To insert an occurrence of the **Chewing Artifact** marker, press the **5** key once to define the beginning of the interval and press the **5** key again to define the end of the interval.
Note: You may use other CinePlex Editor capabilities to change marker occurrence intervals, so a convenient work method is to quickly insert placeholder marker occurrences, which can later be edited to set precise start and end times.
- 6 Insert several more occurrences using the **5** key. As occurrences are entered, they appear in the **Chewing Artifact** Marker Occurrences window. Each marker occurrence appears with the start and end times for each interval.
Note: The Marker Occurrences default window is tall and narrow and it can obscure the complete window title. Move the mouse cursor over the title bar to see the complete title. Also, the title of this window changes to include the currently selected marker in single quotation marks. The information that appears in the window also changes for each marker type. For example, a Coordinate marker shows **Time**, **X**, and **Y** coordinates instead of **Start Time** and **End Time**.
- 7 Click **Pause**. In the **Edit Markers** window next to **Keystroke**, click **Find**.
- 8 Press the **5** key to advance to an occurrence of the **Chewing Artifact** marker. Press the **5** key several times to cycle through the intervals entered.

2.6 Saving and Exporting the Data

This procedure covers the steps required to save the marked-up files from the quick-start example and to export the data for use in other applications. When saving a project, CinePlex Editor saves all the marker information in the CPJ file. You may also export the marker data to:

- PLX file (if the neural data originated in a PLX file): The markers become Type 4 Events in the PLX file, along with the spike and continuous data from the original neural data file.
- NEX file (if the neural data originated in a PLX file): The markers become NEX variables, along with the spike times and continuous data from the original neural data file.

Note: Exporting to PL2 is not available at this time.

- Text file: Each marker occurrence becomes a line in the text file.
- CSV file: Each marker occurrence becomes a line in the CSV file.

2 Getting Started with CinePlex Editor Projects

Note: Text and CSV files can be opened in applications such as Excel® or MATLAB® for additional analysis. In an Excel spreadsheet, each marker occurrence becomes a row in the spreadsheet. In a MATLAB file, each marker occurrence becomes a row in a 2D matrix.

To save the project and export the data, follow the procedure below.

- 1 To save the quick-start example work, click **Save**. The **Save As** dialog box opens with the file name *CM_Quickstart-01*. Click **Save** to save *CM_Quickstart-01*.

Note: If you reload the same CPJ file just saved, the system puts CinePlex Editor back into the same state it was in prior to the save operation. CinePlex Editor reloads with the same markers, marker occurrences, current marker selection, etc.

- 2 For this quick-start example, export the data as a CSV file. From the **File** menu, select **Export Markers**.

The **Export Marker Data** dialog box opens.

Export Marker Data

Format: ☐ Text file ☒ CSV file

Delimiter to use between values: Comma

Which Markers: ☒ Selected Marker only ☐ All Markers

Export a Row of Column Headers

What to Export for Each Marker Occurrence:

☒ Marker Name (N/A for Matlab) ☒ TimeStamp

☒ Marker Type (Number 1-7) ☒ TimeStamp 2 (End Time for Intervals)

☒ Marker Event ID ☒ Value 1 (Scalar value, or X Coordinate)

☒ Marker Event ID 2 ☒ Value 2 (Y Coordinate)

(It is recommended to always export all of these, especially when multiple Marker types are being Exported)

Export TimeStamps in units of: ☒ Seconds ☐ Clock Ticks

Output File:

File: C:\PlexonData\CinePlexV3\Quickstart\CM_Quickstart01.csv

☒ Append if existing

- 3 In the **Format** area, accept the default value **Text file**. The **Export Marker Data** dialog box includes various options for how, where, and what data to export. However, for this quick-start example, accept the defaults values and click **Export!**

The **Export Complete** dialog box appears.

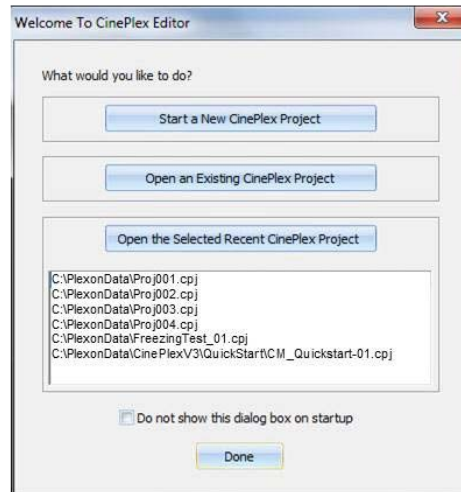
- 4 Locate *CM_Quickstart.txt*. Open the file with Windows Notepad or another text reader to see how the data is exported.

2.7 Re-opening a Project File

This procedure covers the steps required to re-open a project file.

- 1 Exit and re-start CinePlex Editor.

The **Welcome To CinePlex Editor** dialog box opens.



Note: The **Welcome To CinePlex** dialog box now contains an entry for the **CM_Quickstart.cpj** file in the recent projects list box.

- 2 Double-click **CM_Quickstart.cpj** to open the quick-start example project.
CinePlex Editor opens in the same state that it was in when the project file was saved.
- 3 This completes the last procedure in the Quick-Start Example.

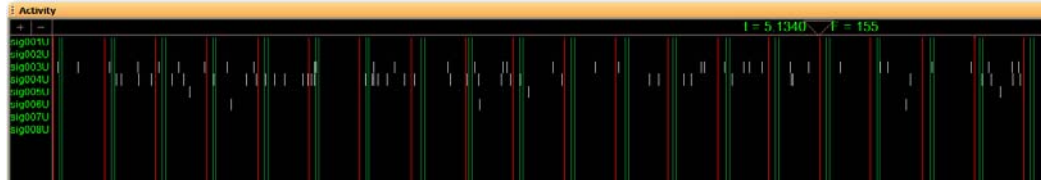
2.8 Using the Activity Window

The Activity window displays data for markers and channels. If the **Show** checkbox for a marker or channel is selected, the Activity window displays the marker or channel. If you deselect a checkbox, the associated marker or channel is not displayed in the Activity window.

In the Activity window, CinePlex Editor provides two frequently-used items to display neural data—the time pointer and the time range. The time pointer represents the concept of a current instant. The frame in the Video window is the frame whose occurrence time is no later than the current time pointer and is the nearest frame on the left side of the current time pointer. The range of neural data in the Activity window is based on the time pointer.

2 Getting Started with CinePlex Editor Projects

The inverted white triangle symbol in the Activity window depicts the current time:



The Activity window displays the current time in seconds (**t**), and the current frame number (**F**). The Activity window default setting positions the current time symbol at the center of the window, so that an equal span of time before and after the current time appears in the window. However, you may reposition the current time symbol by clicking and dragging it with the left mouse button. In this way, you may configure the Activity window to show an asymmetric span of time about the current time; for example, from 1 second before to 5 seconds after the current time.

In general, the time pointer may or may not point to the time of a video frame. The video frame that appears for a given current time is the frame at the *latest* time, which can be less than or equal to the current time. However, you may configure CinePlex Editor to lock the current time to the times of Frame Markers; see **Lock to Video Frames** in [Section 5.5, “Repairing Tracking Coordinates by Replacing Coordinates Marker”](#) on page 68.

You may expand or contract the range of time that appears in the Activity window by clicking **Zoom In** or **Zoom Out**. You may also shift the current time by dragging the scroll bar at the bottom of the window.

You may also override the current time in a more persistent way by using the **Find** functions to change the current time to be that of a marker. For example, by clicking the **Find Occurrences** button, or from the **Find** menu, select **Find Marker Occurrences...**, which opens the **Find Marker Occurrences** dialog box.

2.9 Understanding Looping

By default, CinePlex Editor starts in looping mode, where animation and searches that run past the end of the file restart from the beginning. To turn off looping mode, from the **Looping** menu, click **Toggle Looping**.

2.10 Customizing the User Interface

Although the default user interface setup in CinePlex Editor may be adequate for the needs, you may also customize the user interface. For details on customizing the user interface, see [Appendix B, Navigating the Plexon User Interface](#).

Some general principles and conventions repeat throughout the CinePlex Editor user interface as well as the Plexon User Interface.

- **Right-click Menus** – See [“Right-click Menus”](#) on page B-17.

- **Current Selections** – See [“Current Selections” on page B-17](#). The currently selected marker and channel also appear in their selected color (bright violet by default) in the Activity window.
- **Keystroke Shortcuts** – See [“Keyboard Customization” on page B-19](#).
- **Views** – You may quickly close and re-open windows by using the **View** options or the corresponding toolbar buttons.
- **Undo** – See [“Undo” on page B-17](#).
- **Quick Reference** – See [“Help Menu” on page B-12](#).

2 Getting Started with CinePlex Editor Projects

Chapter 3

Markers and Marker Occurrences

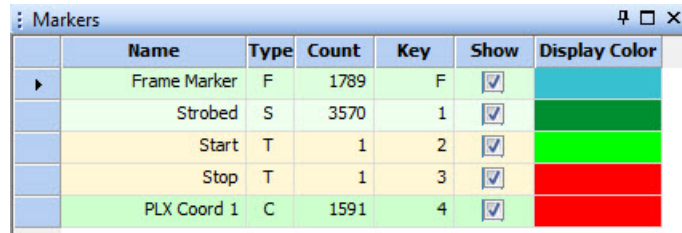
3.1 Overview	22
3.2 Marker Types.....	22
3.3 Defining Markers	24
3.4 Inserting Marker Occurrences	25
3.5 Editing Markers and Marker Occurrences	29
3.6 Automatically Generating Marker Occurrences.....	31
3.7 Operating with Marker Occurrences.....	34
3.8 Selecting and Editing Marker Occurrences	39
3.9 Entering or Editing Coordinate Markers	40
3.10 Importing Markers	41
3.11 Exporting Markers to text or CSV files.....	41
3.12 Exporting Marker Occurrences Data as a PLX File.....	43
3.13 Exporting Marker Occurrences Data as a NEX File	44

3 Markers and Marker Occurrences

3.1 Overview

This chapter explains how to use markers and marker occurrences. Markers are designators that are used to identify or describe timepoints in a file.

The Markers window in the upper left corner of the main view shows the set of markers imported from the data files.



The screenshot shows a window titled "Markers" with a table containing the following data:

	Name	Type	Count	Key	Show	Display Color
▶	Frame Marker	F	1789	F	<input checked="" type="checkbox"/>	Light Blue
	Strobed	S	3570	1	<input checked="" type="checkbox"/>	Dark Green
	Start	T	1	2	<input checked="" type="checkbox"/>	Bright Green
	Stop	T	1	3	<input checked="" type="checkbox"/>	Red
	PLX Coord 1	C	1591	4	<input checked="" type="checkbox"/>	Red

The triangular symbol in the left column indicates the current marker. The Markers window shows the following basic information about each marker:

- **Name** shows the name assigned to the marker. Marker names must be unique.
- **Type** indicates the abbreviation that denotes the type of the marker; for a complete list of marker types, see [Section 3.2, “Marker Types” on page 22](#).
- **Count** shows the number of occurrences of each marker type.
- **Key** indicates the keystroke that is associated with this marker, which can be used to find and insert markers.
- **Show** indicates if the occurrences of this marker display in the Activity window.
- **Display Color** shows the color of the occurrences of this marker in the display views.

To use CinePlex[®] Editor effectively, it is important to understand the difference between a *marker* and a *marker occurrence*. A marker is defined by its type and name. A marker occurrence is a specific insertion of a marker at a designated time. Each marker can have many marker occurrences associated with it. Before any marker occurrences for a given marker can be created, that marker must exist.

3.2 Marker Types

Every marker has a *marker type* definition. Each marker occurrence stores at least one timestamp, along with other supplemental data, depending on the marker

type. The following table describes each marker type and the information it stores for each occurrence:

Marker Type	Abbr	Information Stored	Description
Time Only	T	Timestamp	Single happenings, where the only required information is the time of the happening. E.g. "Shock Applied"
Frame	F	Timestamp	Special time-only marker applied automatically by CinePlex Studio to associate a time with each video frame. Note: This marker always appears grayed out in the Define New Marker dialog box because it is system-generated.
Interval	I	Start Timestamp, End Timestamp	Denotes a time interval over which something occurred. E.g. "Stimulus Applied" or "Valid Trial"
Scalar	S	Timestamp, Value	Denotes a value (stored in a 16-bit number) at a given time. E.g. the Motion Measure produced by the CinePlex Studio Tracking Option.
Coordinates	C	Timestamp, X, Y	Denotes a pair of values (stored in 16-bit numbers) at a given time. E.g. Animal coordinates produced by the CinePlex Studio Tracking Option.
Freezing Episode	FE	Start Timestamp, End Timestamp	A special version of an interval marker where the intervals are automatically produced by applying a freezing detection operation to the values of the Motion Measure marker (using the Freezing Detector). E.g. "Rat Froze" instance.
Level Interval	L	Start Timestamp, End Timestamp	A special version of an interval marker where the intervals are automatically produced by applying a thresholding operation to the values of a Scalar marker (using the Level Editor).
Zone Interval	R	Start Timestamp, End Timestamp	A special version of an interval marker where the intervals are automatically produced when the values of a 2D vector are inside a certain spatial zone (using the Zones Editor). E.g. "Rat In Maze Arm 3"

3 Markers and Marker Occurrences

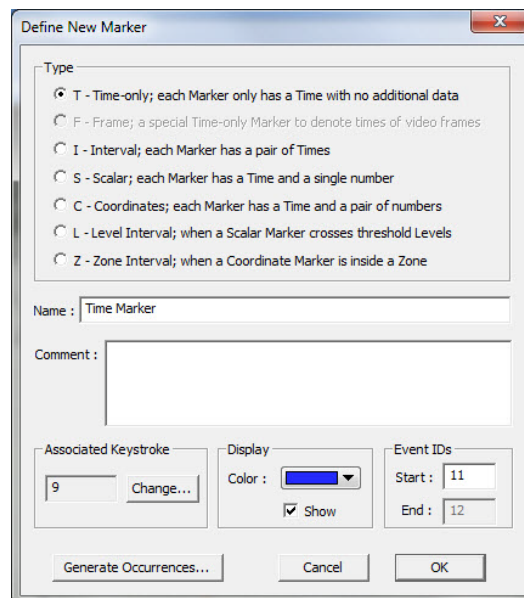
It is possible to open a quick reminder of the marker types and their abbreviations; see **Quick Reference** in “[Help Menu](#)” on [page B-12](#). Throughout this manual, the marker types Interval, Level Interval, and Zone Interval are collectively referred to as *interval-type markers* or *interval markers*, as they share many common characteristics.

3.3 Defining Markers

To define a CinePlex Marker, designate it as one of the available marker types defined in the table above ([Section 3.2, “Marker Types” on page 22](#)), and name the marker uniquely. You may add optional information to the definition such as comments, associated keystroke, display color, and associated event IDs. Follow the procedure below to define markers.

- 1 On the **Edit** menu, click **Define New Marker**.

The **Define New Marker** dialog box appears.

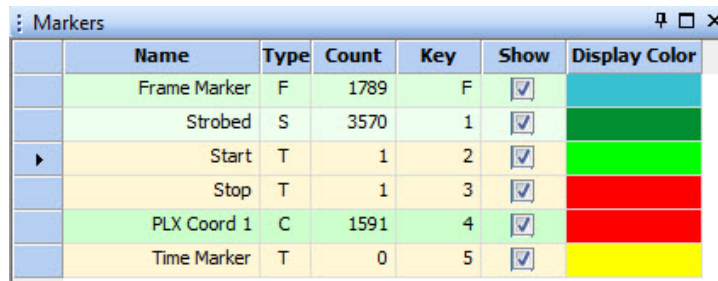


Note: The F (Frame) marker is a special time-only marker applied automatically by CinePlex Studio to associate a time with each video frame. This marker always appears grayed out in the Define New Marker dialog box because it is system-generated.

- 2 In the **Type** area, click a marker type.
- 3 In the **Name** box, type a unique name for the marker.
- 4 If needed, adjust parameters in the dialog box, such as **Associated Keystroke**, **Display**, **Event IDs**, and **Show**.

5 Click **OK**.

The new marker appears as the selected marker in the list in the Markers window. You can select/deselect the Show checkbox to show/hide a particular marker in the Activity window on the CinePlex Editor main screen.



The screenshot shows the 'Markers' window with a table of marker data. The table has columns for Name, Type, Count, Key, Show, and Display Color. The 'Start' marker is selected, indicated by a blue arrow icon in the first column.

	Name	Type	Count	Key	Show	Display Color
	Frame Marker	F	1789	F	<input checked="" type="checkbox"/>	Light Blue
	Strobed	S	3570	1	<input checked="" type="checkbox"/>	Dark Green
▶	Start	T	1	2	<input checked="" type="checkbox"/>	Bright Green
	Stop	T	1	3	<input checked="" type="checkbox"/>	Red
	PLX Coord 1	C	1591	4	<input checked="" type="checkbox"/>	Red
	Time Marker	T	0	5	<input checked="" type="checkbox"/>	Yellow

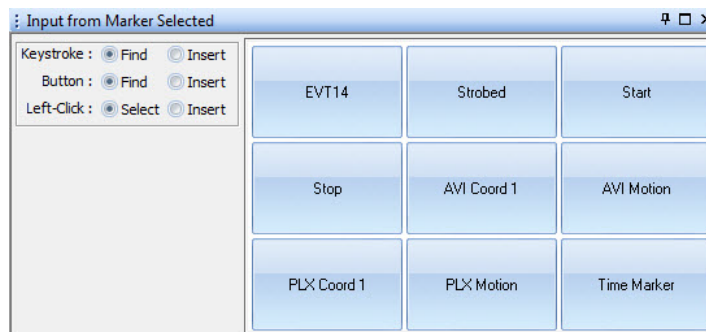
For additional details about working with markers, see [Define New Marker](#) on page A-37.

3.4 Inserting Marker Occurrences

There are three primary methods to insert new marker occurrences:

- Keystroke
- Button
- Left-Click (of the mouse button)

In the Input window, select an input method. For more information on the Input window, see [“Input Window”](#) on page A-16.



Note: You may also use items from the **Edit** menu to choose one these input methods to insert new marker occurrences. For more information, see [“Edit Menu”](#) on page A-37.

Keystroke

To use the keystroke method to insert marker occurrences, associate a key with each marker for which occurrences are created. When defining a marker, you typically associate a keystroke with it. The associated keystroke appears in the **Key** column of the **Markers** window.

3 Markers and Marker Occurrences

Note: If there is no associated key with the marker or to change the key association, from the right-click menu in the **Markers** window, click **Edit Selected Marker** to open the **Edit Marker** dialog box. For more information, see [“Edit Selected Marker” on page A-39](#).

To insert marker occurrences using the keystroke method, follow the procedure below.

- 1 In the Input window, next to **Keystroke** click **Insert**.

Note: This arms CinePlex Editor to insert an occurrence of a marker at the current time when pressing the key associated with that marker.

- 2 Use keystroke insertion when CinePlex Editor is paused or playing. Enter marker occurrences with keystrokes for each marker type as follows:
 - For Time Only (T) markers – Press the associated key once to insert a single marker occurrence at the current time.
 - For Interval (I) markers – Press the associated key once to start the interval. Press the key a second time to end the interval.
 - For Scalar (S) markers – The keystroke behavior for Scalar markers changes with the animation status as follows:
 - If paused – Open a **Scalar** window for the marker. Press the associated key and drag the mouse pointer in the **Scalar** window to set the value for the new occurrence.
 - If playing – Open a **Scalar** window for the marker. Press the associated key to pause the animation. Drag the mouse pointer in the **Scalar** window to set the value for the new occurrence.
 - For Coordinate (C) markers – Press the associated key and move the mouse pointer in the **Video** window and click to enter the coordinate values. If it was playing before pressing the key, after clicking, CinePlex Editor enters the new marker occurrence, and resumes animation.

Note: Although you typically insert Level Interval (L) and Zone Interval (Z) markers automatically by using the **Levels Editor** and **Zones Editor** dialog boxes, you may also enter them with a keystroke.

Note: For Scalar and Coordinate markers, to use the keystroke or button method you must set the value of the Scalar or Coordinate marker occurrence by clicking the mouse in either the Scalar window or the Video window. For this reason, the left-click input method is better for entering Scalar or Coordinate marker occurrences. Also, it does not make sense to use the keystroke or button input methods unless the Scalar or Video windows are open.

Button Insertion

The Input window includes an associated button for each marker. Each button displays the marker name. CinePlex Editor automatically creates a button for each new marker defined. As you define new markers or reposition the Input window, the button palette rearranges itself. Follow the procedure below:

- 1 In the Input window, next to **Button** click **Insert**.
- 2 To insert a marker occurrence, in the Input window click the appropriate marker button.

system inserts the occurrence at the current time.

Note: With button insertion, each marker type behaves exactly the same as described in the preceding section for keystrokes.

Left-Click Insertion

The Left-Click insertion method is fundamentally different from the other insertion methods. Use the Left-Click method only to insert occurrences for the currently selected marker.



CAUTION

Select the correct type of marker

Be sure you have selected the marker that corresponds to the type of occurrences that you want to create.

Understanding Click-To-Add Mode

Click-To-Add mode is a semi-automatic subset of the Left-Click insertion method. In Click-To-Add mode, each time a marker is chosen and the left mouse button is clicked, CinePlex Editor inserts an occurrence of the marker and automatically advances the video by a preset number of frames. Two examples follow:

- Example 1: You watch each frame in the Video window and assign a Scalar value to some on-screen behavior, say a number between 1 and 10 for a rat's activity level. To assign a range to the Scalar window, see [“Scalar Right-click Menu” on page A-25](#). With each frame, left-click in the Scalar window to enter a Scalar marker occurrence with a value that corresponds to the location clicked in the **Scalar** window, at the time of the current video frame. After each left-click, CinePlex Editor automatically advances to the next frame or to the number of frames set. To set the number of frames, see **Number of Frames to Advance During Click-To-Add** in [“General Tab” on page A-57](#).
- Example 2: You watch each frame in the Video window and mark some position of interest, for example, the end of the rat's tail. With each frame, left-click in the Video window to enter a Coordinate marker occurrence with a value that corresponds to the location clicked in the Video window, at the time of the current video frame. After each left-click, CinePlex Editor automatically advances to the next frame or to the number of frames set.

To insert marker occurrences with a mouse click, follow the procedure below.

- 1 In the Input window, next to **Left-Click** click **Insert**.

Note: This arms CinePlex Editor to insert an occurrence of a marker at the current time when clicking (left-click) the mouse.

3 Markers and Marker Occurrences

- 2 In the **Markers** window, click the marker for which to insert occurrences.
A >> appears in the left most column to designate the marker as the currently selected marker.
- 3 Use mouse click insertion when CinePlex Editor is paused or playing. Enter marker occurrences for each marker type as follows:
 - For Time Only (T) markers – Click in the Activity window only, as follows, otherwise CinePlex Editor ignores the click.
 - If paused – Click anywhere in the window and the occurrence appears at the time corresponding to the pointer location.
 - If playing – Because the display typically moves too fast for precise insertion, click anywhere in the window and the occurrence appears at the current time. Keep the pointer over the Activity window while watching the video and click to insert each occurrence.
 - For Interval (I) markers – Click in the Activity window only, as follows, otherwise CinePlex Editor ignores the click.
 - If paused – Click once to mark the start of the interval. Click a second time to mark the end of the interval. You may enter the ends of the interval in either order, but CinePlex Editor always makes the earlier time the start time for the Interval marker occurrence.
 - If playing – Click once to mark the start of the interval. *The start time appears at the current time and the interval expands.* Click a second time to mark the end of the interval. The end also appears at the current time. You may keep the pointer over the Activity window while watching the video, then click to mark the start time and click again to mark the end time of each occurrence.
 - For Scalar (S) markers – Click in the Scalar window only, as follows, otherwise CinePlex Editor ignores the click.
 - If paused – *Click-To-Add* mode activates; see [“Understanding Click-To-Add Mode” on page 27](#). Click to insert a Scalar marker occurrence with a value (see Note that follows) that corresponds to the location clicked in the Scalar window, at the time of the current video frame. With this feature, you may enter a new Scalar occurrence on every nth frame and then use the **Interpolate Missing Occurrences** feature to fill in the skipped values; see [“Understanding Click-To-Add Mode” on page 27](#).
Note: You must have the Scalar window configured correctly for the desired range of the Scalar value; see [“Scalar Right-click Menu” on page A-25](#).
 - If playing – Click to insert an occurrence at the current time with a value that corresponds to the location clicked in the Scalar window. The animation does not pause.
 - For Coordinate (C) markers – Click in the Video window only, as follows, otherwise CinePlex Editor ignores the click.

- If paused – *Click-To-Add* mode activates; see [“Understanding Click-To-Add Mode” on page 27](#). Click in the Video window to enter a Coordinate marker occurrence with a value that corresponds to the location clicked in the Video window, at the time of the current video frame. With this feature, you may enter a new Coordinate occurrence on every nth frame and then use the interpolate missing occurrences feature to fill in the skipped values; see [“Interpolating Missing Marker Occurrences” on page 38](#).
- If playing – Click to insert an occurrence at the current time with a value that corresponds to the location clicked in the Video window. The animation does not pause.

Note: The left-click method works for Level Interval and Zone Interval markers. However, in general you should automatically generate these marker types by using the **Levels Editor** and **Zones Editor** dialog boxes. See [Chapter 4, Using the Freezing Detector, Levels Editor and Zones Editor](#).

3.5 Editing Markers and Marker Occurrences

This section includes a series of short procedures dealing with markers and marker occurrences. Each procedure uses the most-efficient primary method, but additional methods that can be used to accomplish the same task appear in parentheses after the primary one.

Copying a selected marker

- 1 In the Markers window, select the marker to copy.
- 2 From the Markers window right-click menu, choose **Make Copy of Selected Marker** (or from the **Edit** menu, choose **Make Copy of Selected Marker**). An exact copy of the selected marker named **Copy of <OldMarker>** appears in the Markers window.

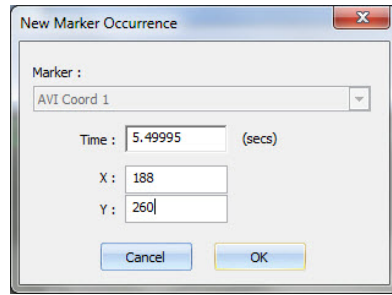
Note: The new marker has the same marker occurrences. However, the new marker gets new values for the associated key and for the Event ID(s), since those values need to be unique among the markers.

Adding new marker occurrences

- 1 In the Marker Occurrences window, select the marker for the new occurrence.
- 2 From the Marker Occurrences window right-click menu, choose **Add New Marker Occurrence** (or from the **Edit** menu, choose **Add New Marker**

3 Markers and Marker Occurrences

Occurrence, or click the **Add New Marker Occurrence** button). The **New Marker Occurrence** dialog box for the selected marker opens.



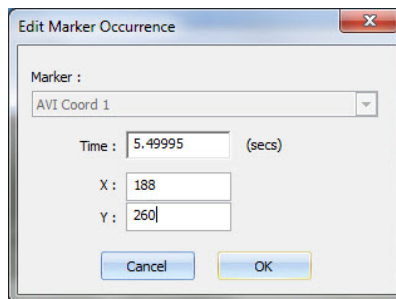
Note: For more information on the **New Marker Occurrence** dialog box, see [“Add New Marker Occurrence” on page A-40](#).

- 3 In the **Time** box, type a time in seconds for the marker occurrence. If the marker is a Coordinate marker, type the **X** and **Y** coordinates. Click **OK**.

Editing marker occurrences

- 1 In the Marker Occurrences window, select the marker occurrence to edit.
- 2 From the Marker Occurrences window right-click menu, choose **Edit Selected Marker Occurrence** (or from the **Edit** menu, choose **Edit Selected Marker Occurrence**, or click the **Edit Marker Occurrence** button):

The **Edit Marker Occurrence** dialog box opens.



Note: For more information on the **Edit Marker Occurrence** dialog box, see [“Edit Selected Marker Occurrence” on page A-41](#).

- 3 In the **Time** and **End Time** boxes, type new times in seconds. If the marker type includes coordinates, change these as needed. Click **OK**.

Deleting a selected marker

Follow the procedure below to delete a selected marker.

- 1 In the Markers window, select the marker to delete.
- 2 From the Markers window right-click menu, choose **Delete Selected Marker** (or from the **Edit** menu, choose **Delete Selected Marker**, or click the **Delete Selected Marker** button):

CinePlex Editor immediately deletes the selected marker and its marker occurrences.

Note: CinePlex Editor provides no confirmation before it deletes the marker. However, to undo the deletion, from the **Edit** menu, click **Undo**.

Deleting selected marker occurrences

- 1 In the Marker Occurrences window, select a marker occurrence to delete.

Note: To delete more than one occurrence, see [Step 3](#).

- 2 From the Marker Occurrences window right-click menu, choose **Delete Selected Marker Occurrence** (or from the **Edit** menu, choose **Delete Selected Marker Occurrence**, or click the **Delete Marker Occurrence** button):

CinePlex Editor deletes the currently selected marker occurrence.

- 3 You may also select multiple occurrences to delete. To delete a currently selected marker occurrence plus all of the marker occurrences that are highlighted with a black background in the Marker Occurrences window, from the right-click menu choose **Delete Highlighted Marker Occurrences**.

CinePlex Editor immediately deletes all of the marker occurrences that are highlighted in the Marker Occurrences window.

Note: CinePlex Editor includes other right-click menu entries for selecting and copying text with marker occurrence information onto the Windows clipboard, which can be pasted into other applications.

Deleting all occurrences of a selected marker

- 1 In the Markers window, select the marker with the marker occurrences to delete.
- 2 From the Markers window right-click menu, choose **Delete all Occurrences of Selected Marker** (or from the **Edit** menu, choose **Delete all Occurrences of Selected Marker**, or click the **Delete all Occurrences of Selected Marker** button):

CinePlex Editor immediately deletes all marker occurrences for the selected marker.

Note: CinePlex Editor does not delete the marker itself, but it removes all occurrences of the marker. CinePlex Editor provides no confirmation before it deletes the marker occurrences. However, to undo the deletion, from the **Edit** menu, click **Undo**.

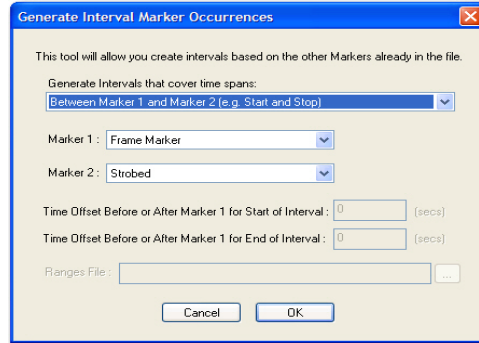
3.6 Automatically Generating Marker Occurrences

CinePlex Editor can automatically generate marker occurrences. When you define a new marker using the **Define New Marker** dialog box (see [Section 3.3, “Defining Markers” on page 24](#)), you may choose to have CinePlex Editor populate the new marker with algorithmically-generated marker occurrences. The available algorithms for generating marker occurrences depend on the marker type, which the following sections describe.

3 Markers and Marker Occurrences

Automatically generating Time-Only or Frame Marker occurrences

- 1 To automatically generate Time-Only or Frame Marker occurrences, in the **Define New Marker** dialog box, click **T** then click **Generate Occurrences** to open the **Generate Marker Occurrences** dialog box.

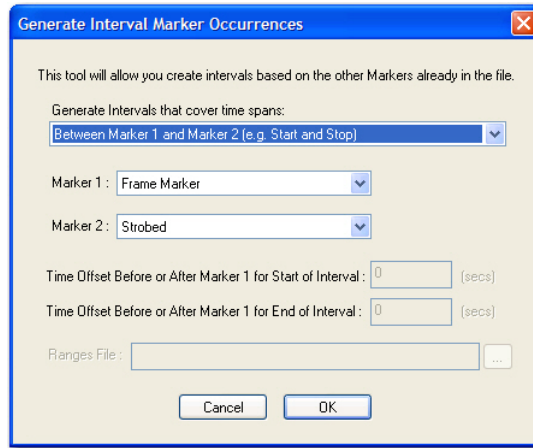


- 2 To generate occurrences for this marker from the occurrences of another marker, click **Generate from occurrences of another Marker**. Otherwise, go to [Step 4](#).
- 3 Select a marker from the drop-down list. Click **OK**.
CinePlex Editor generates marker occurrences at the times of the occurrences of the marker selected in the drop list.
- 4 To generate occurrences for this marker based on other criteria, click **Generate based on**.
- 5 To generate regularly-spaced marker occurrences, in the **Time of First Occurrence** box type an offset from the beginning of the file.
- 6 To space the occurrences at intervals such that they occur at a specified rate, in the **Occurrence Rate** box, type the rate in occurrences per second.
- 7 To specify the total number of marker occurrences to generate, in the **Number to Generate** box, type the total.

Note: Under some conditions, the New Project Wizard also displays the **Generate Marker Occurrences** dialog box so that the required frame marker occurrences can generate. The suggested values that appear in the **Occurrence Rate** and **Number to Generate** edit boxes when the dialog box first appears correspond to the frame rate and number of frames detected in the currently-loaded video data file. In most cases, simply click **OK** to generate appropriate frame marker occurrences.

Automatically generating Interval marker occurrences

- 1 To automatically generate Interval marker occurrences, in the **Define New Marker** dialog box, click **I**, then click **Generate Occurrences** to open the **Generate Interval Marker Occurrences** dialog box.



- 2 From the **Generate Intervals that cover time spans** drop-down list box, select one of the following algorithms to generate the intervals:
 - **Between Marker 1 and Marker 2** – If this algorithm is selected, go to [Step 3](#).
 - **Around Marker 1** – If this algorithm is selected, go to [Step 4](#).
 - **Between a time offset from Marker 1 and a time offset from Marker** – If this algorithm is selected, go to [Step 5](#).
 - **Defined by time ranges read in from a file** – If this algorithm is selected, go to [Step 6](#).
- 3 Select entries in the **Marker 1** and **Marker 2** lists. Click **OK**.

Intervals generate with a start time that corresponds to the occurrence times of the **Marker 1** selection. The end time correspond to the first subsequent occurrence time of the **Marker 2** selection. CinePlex Editor ignores additional occurrences of Marker 1 that occur before an ending Marker 2.
- 4 Select entries in the **Marker 1** list. In the two **Time Offset...** boxes, enter time offsets TS and TE in seconds. Click **OK**.

Note: For every occurrence of Marker 1 at time t , an interval generates from time $t + TS$ to time $t + TE$, where TS and TE are the time offsets entered in the first and second marker boxes respectively. TS and TE can be positive or negative.
- 5 Select entries in the **Marker 1** and **Marker 2** lists, and enter time offsets in the **Time Offset...** boxes. Offsets can be positive or negative. Click **OK**.

Note: This is a generalization of the first algorithm where the interval is offset in a fashion similar to the second algorithm from the exact times of the start and end marker occurrences.

3 Markers and Marker Occurrences

- 6 In the **Ranges File** box, type or select a text file that contains the ranges. Click **OK**.

Note: The format of the text file is one range per line of text, with each line containing the start time and end time in seconds. The delimiter between the times can be a comma, a space, or a tab.

Automatically generating Scalar and Coordinate marker occurrences

- In the **Define New Marker** dialog box, if you select **S** (Scalar) or **C** (Coordinate) and click **Generate Occurrences**, CinePlex Editor just generates some fake, random data for testing and demonstration purposes. It has no usefulness in general.

Automatically generating Level Interval and Zone Interval marker occurrences

- In the **Define New Marker** dialog box, if you select **L** (Level Interval) or **R** (Zone Interval) and click **Generate Occurrences**, CinePlex Editor defines the new marker and then opens either the **Levels Editor** or **Zones Editor** dialog boxes. Use the editors to generate occurrences based on level crossings for Scalar markers, or Zone containment for Coordinate markers. For detailed information on the Levels Editor and Zones Editor, see [“Levels Editor” on page A-46](#) and [“Zones Editor” on page A-48](#).

3.7 Operating with Marker Occurrences

With CinePlex Editor, you may perform certain simple operations on marker occurrences. You can find, move, and delete occurrences. You may also shift, align and interpolate marker occurrences, and invalidate waveforms that occur either inside or outside of Interval marker occurrences.

Finding Marker Occurrences

CinePlex Editor provides the following three ways to find marker occurrences:

- Keystroke
- Button
- Using the Find menu items or toolbar buttons
 - Finding marker occurrences with a keystroke:

In the Input window next to **Keystroke**, click **Find**. Press the key associated with the marker, which appears in the **Key** column of the **Markers** window.

CinePlex Editor advances the file in the **Activity** window to align the first occurrence of the marker with the current time triangle.
 - Finding marker occurrences with a button click:

In the Input window next to **Button**, click **Find**. In the Input window, click the button associated with the marker.

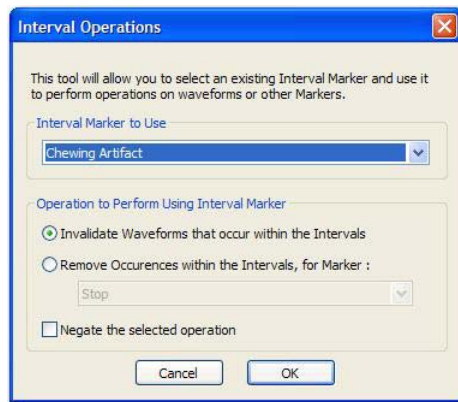
CinePlex Editor advances the file in the Activity window to align the first occurrence of the marker with the current time triangle.

For additional information on finding marker occurrences, see [“Find Marker Occurrences” on page A-45](#).

Interval Operations

For Interval, Level Interval, or Zone Interval markers, you may invalidate spike waveforms inside or outside of the Intervals, or remove the occurrences of other markers that fall inside or outside of the intervals.

To use an Interval marker (see [Section 2.4, “Defining a New Marker” on page 12](#)) for operations, from the **Tools** menu, click **Interval Operations** to open the **Interval Operations** dialog box:



From the **Interval Marker to Use** list, choose one of the currently-defined Interval, Level Interval, or Zone Interval markers.

To mark as invalid each waveform (spike time) in every channel that falls inside the start and end times of all occurrences of the Interval marker, click **Invalidate Waveforms that occur within the Intervals**. This operation can be inverted; before doing so, see the cautionary note in this section.

If a marker occurrence falls inside a defined interval, you may remove that marker occurrence. To do so, click **Remove Occurrences within the Intervals, for Marker**, and choose a non-Interval marker from the second list. This operation may be inverted; before doing so, see the following cautionary note.



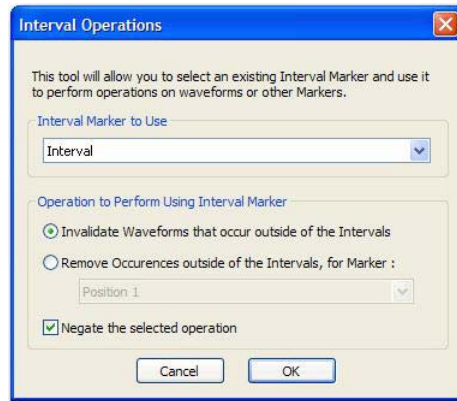
CAUTION

Negate inverts the selection for the entire file

If you click **Negate the selected operation**, the selection is logically inverted. This means you invalidate or remove all the items you did *not* select, which is the entire portion of the file outside the limits of the Interval occurrences.

3 Markers and Marker Occurrences

If you click **Negate the selected operation**, in the **Interval Operations** dialog box, the text in the **Operation to Perform Using Interval Marker** area changes as follows:

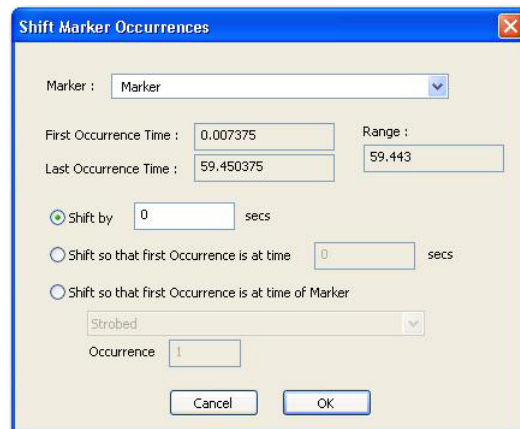


If you choose an operation and click **Negate the selected operation**, you either invalidate all waveforms that *do not* fall between the start and end times of any Interval occurrences or remove all occurrences of the selected marker that *do not* occur inside the time span any Interval marker occurrence. For more information on the **Interval Operations** dialog box, see [“Interval Operations” on page A-50](#).

Shifting Marker Occurrences

You may add a constant offset, which can be negative, to all the timestamps of a marker. You may use this capability to align neural data files and video files.

- 1 From the **Tools** menu, click **Shift Marker Occurrences** to open the **Shift Marker Occurrences** dialog box:



- 2 Choose a marker from the **Marker** list.

Note: The first, last, and range of times covered by the occurrences of the chosen marker appear below the **Marker** list.

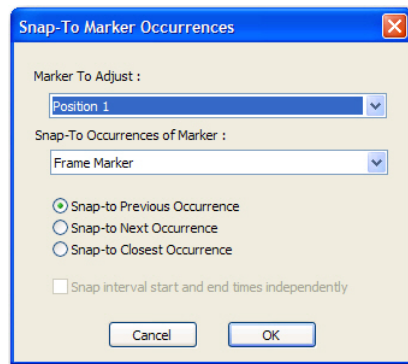
- 3 Choose one of the following methods for specifying the time shift:
 - To shift marker occurrences by a fixed amount, in the **Shift by** box, enter the amount of the shift in seconds.
 - To shift marker occurrences so that the first occurrence is at a specified time, enter the specified time in seconds in the **Shift so that first Occurrence is at time** box. CinePlex Editor applies this shift amount to all occurrences.
 - To shift marker occurrences so that the first occurrence of a marker to shift is at the time of another marker occurrence, select the marker representing the time to shift *to* from the **Shift so that first Occurrence is at time of Marker** list, and enter the occurrence of the marker to use by typing its 1-based index in the **Occurrence** box.
- 4 Click **OK** to shift the marker occurrences and close the dialog box.

Snap-To Marker Occurrences

The **Snap-To Marker Occurrences** tool repositions the occurrences of a marker to align in time with the occurrences of another marker.

- 1 From the **Tools** menu, choose **Snap-To Marker Occurrences**

The **Snap-To Marker Occurrences** dialog box opens.



- 2 From the **Marker To Adjust** list, choose the marker to match up in time. From the **Snap-To Occurrences of Marker** list, choose the marker representing the occurrences to match in time.

Note: Typically, the entry in **Marker To Adjust** is the one to align with the times of the video frames and the entry in **Snap-To Occurrences of Marker** is a Frame marker. CinePlex Editor uses the following algorithm: For every occurrence of the entry in **Marker To Adjust**, CinePlex Editor finds the *best match* occurrence of the entry in **Snap-To Occurrences of Marker**, and makes the occurrence time of the entry in **Marker To Adjust** equal to the time of the *best match* occurrence.

- 3 To determine the *best match* occurrence of the entry in **Snap-To Occurrences Marker**, click one of the following items:
 - **Snap-to Previous Occurrence:** Click this item to use the occurrences that are positioned immediately before the times of the entry in **Marker To Adjust**. This adjustment always reduces the time of the occurrences being adjusted.

3 Markers and Marker Occurrences

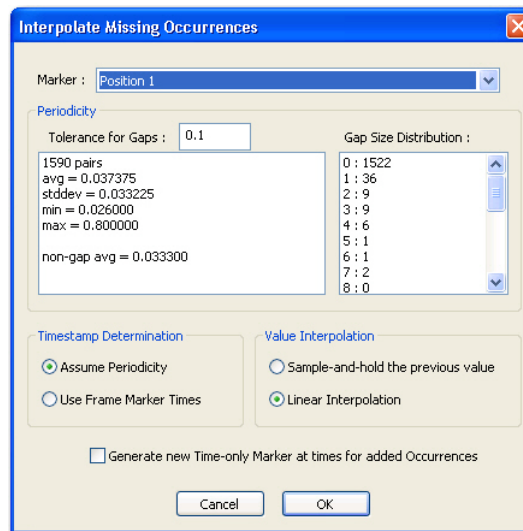
- **Snap-to Next Occurrence:** Click this item to use the occurrences that are positioned immediately after the times of the entry in **Marker To Adjust**. This adjustment always increases the time of the occurrences being adjusted.
 - **Snap-to Closest Occurrence:** Click this item to use the occurrences that are closest in time the entry in **Marker To Adjust**. This adjustment can shift the occurrence being adjusted either direction in time.
- 4 If the entry in **Marker to Adjust** is an Interval-type marker, it consists of two times—a start time and an end time. To adjust the span, which can change the duration of the interval by making both the start and the end times snap to their respective *best match* occurrences, click **Snap interval start and end times independently**. To retain the span, which retains the duration of the interval by only making the start times snap to their *best match* occurrences and shifting the end times to match, click to clear the checkbox.
 - 5 Click **OK** to adjust the occurrences and close the dialog box. A confirmation dialog box appears to display how many marker occurrences were moved. The result may be two or more markers with the same timestamp.

Interpolating Missing Marker Occurrences

This tool is useful for adding entries in any gaps in marker occurrences. For example, when tracking some feature on the video by hand, you may enter tracking coordinates only for every n th frame, and then interpolate them to complete the remaining frames; this is a form of *key-frame animation*. Also, CinePlex Studio is occasionally unable to provide valid coordinates for some video frames, for example, when the headset cable for a rat occludes the LED being tracked. You may use this tool to complete tracking coordinates for every frame.

- 1 From the **Tools** menu, choose **Interpolate Missing Occurrences**.

The **Interpolate Missing Occurrences** dialog box opens.



Note: For detailed information on how the interpolation algorithm runs, see [“How the Interpolation Algorithm Works” on page A-56](#).

- 2 In the Timestamp Determination area, choose one of the following items:
 - **Assume Periodicity:** If the results in the **Periodicity** area indicate that the data is truly periodic enough so that filling in gaps by assuming a periodicity is valid, click this item.
 - **Use Frame Marker Times:** If there should be marker occurrences for the selected marker for every frame, click this item; this lets the frame markers—not the periodicity analysis—determine where missing marker occurrences appear.
- 3 In the **Value Interpolation** area, if the marker being interpolated is a Scalar marker or a Coordinates marker, choose one of the following methods to calculate reasonable values to give the added marker occurrences:
 - **Sample-and-hold the previous value** – Click this item to assign the value or coordinates of the last pre-gap marker occurrence to the new marker occurrences that fill the gap.
 - **Linear Interpolation** – Click this item to assign values to the new marker occurrences that fall on a line connecting the last pre-gap value or coordinates with the first post-gap value or coordinates.
- 4 To have CinePlex Editor define and populate a new marker to identify the marker occurrences that it generates through interpolation, click **Generate new Time-only Marker at times for added Occurrences**. Otherwise, click to clear the checkbox.

Note: If you choose this item, CinePlex Editor defines a new marker name “Interpolated X”, where X represents the name of the interpolated marker; this *tags* the occurrences that are not part of the original data.
- 5 Click **OK** to close the dialog box.

CinePlex Editor adds the new occurrences to the file and, if you chose the item in [Step 4](#), adds an new row entitled “Interpolated ___” to the list in the Activity window.

For additional information about coordinate markers, see the following sections:

- [Section 5.4, “Entering a Coordinates Marker to Track Animal Movement” on page 67](#)
- [Section 5.5, “Repairing Tracking Coordinates by Replacing Coordinates Marker” on page 68](#)
- [Appendix A, CinePlex Editor User Interface](#)—See information about the Activity window, Markers window and the Edit Markers menu option.

3.8 Selecting and Editing Marker Occurrences

To select a marker, in the Activity window, double-click on any marker time-line, or on the label for a marker. The label of the marker selected appears in the highlight color, which is violet by default.

In the Input window (see [“Input Window” on page A-16](#)), if you choose **Select** for the **Left-Click** input, a left click in the Activity window selects the nearest on-

3 Markers and Marker Occurrences

screen marker occurrence for the selected marker. The selected marker occurrence appears with a white box around it:

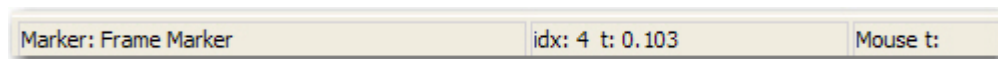


If you select the end time interval, the white box appears around the end time tick mark and the interval line:



In the **Marker Occurrences** window, the newly selected marker occurrence appears with a > next it, and the window can scroll to position the newly selected marker occurrence near the top of the view. If the Activity window is in the mode where it is selecting the nearest marker occurrence, the mouse pointer becomes white crosshairs.

In the Activity window, the status bar shows useful information about the selected marker and marker occurrence. The name of the selected marker appears and the 1-based index of the selected marker occurrence; for example, in the following image **idx** indicates the 4th occurrence of this marker and **t** indicates its time in seconds:



In the Activity window, you may also drag selected marker occurrences to different times; this enables you to make minor adjustments to the positioning of marker occurrences. To drag a marker occurrence to a new time, hold down the **SHIFT** key, click the marker occurrence, and drag it to a new time. For Interval-type markers, you may independently adjust the start and end times; for selection techniques, see the preceding paragraphs.

3.9 Entering or Editing Coordinate Markers

In the Input window (see [“Input Window” on page A-16](#)), if you choose **Insert** for the **Left-Click** input and the selected marker is a Coordinate marker, you may enter or change coordinates by clicking in the Video window. If the Video window is in the mode where a left-click can change or add new Coordinate marker occurrences, the mouse pointer in the Video window changes to crosshairs and a line of text at the bottom of the window shows the current coordinates.

Because CinePlex Editor can enable only one marker occurrence for any given time, if you enter a new coordinate at the time of an existing marker occurrence, you effectively replace the existing coordinates. Thus, if the Coordinate marker occurrences occur at the same time as the Frame marker occurrences, you may *touch up* existing coordinates with a simple click on the new location.

By default, the Click-To-Add feature (see “[Left-Click Insertion](#)” on [page 27](#)) automatically advances a number of frames, so if you continually click in the **Video** window you can quickly enter a sequence of coordinates on subsequent video frames.

3.10 Importing Markers

CinePlex Editor can import additional markers and marker occurrences from additional neural data files into an existing project. You may add neural data files to the project and process them as during the initial import of neural data when the project was first created (see [Section 2.2, “Setting Up a New Project” on page 7](#)). You may turn their events (from PL2 or PLX files) or variables (from NEX files) into the appropriate markers and marker occurrences.

To import markers, from the **File** menu, click **Import Markers** to open a Windows file selection dialog box for the neural data file. After selecting the file, click **OK** to import the data from that file as new markers. CinePlex Editor must have unique marker names, so if a marker name from the imported neural data files conflicts with an existing marker, CinePlex Editor renames the file by adding “_n” to the name, and increasing the number *n* until it establishes a unique name.

3.11 Exporting Markers to text or CSV files

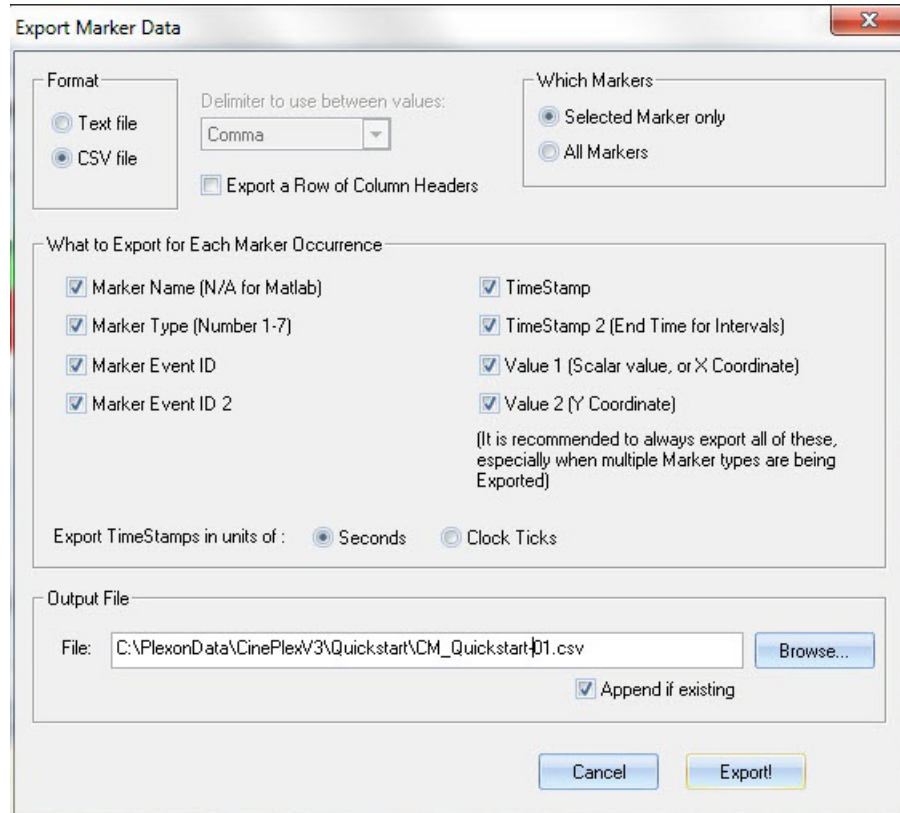
CinePlex Editor can export marker occurrences data in a tabular format to either a text file or comma-separated-values (CSV) file. Files in either of those formats can then be imported into other applications for data analysis. For example, a CSV file can be opened in MATLAB® or Excel® programs.

Exporting makers as Text or CSV files

- 1 From the **File** menu, click **Export Markers** to open the **Export Marker Data** dialog box.

The **Export Marker Data** dialog box opens.

3 Markers and Marker Occurrences



- 2 In the **Format** area, select the type of file to export.
- 3 For all formats, CinePlex Editor exports one marker occurrence per row (or per line for text files), and all rows have the same number of columns.
For **Text file** only: From the **Delimiter to use between values** list, select one of the following delimiters: **Comma**; **Comma, Space**; **Space**; **Semicolon**; or **Tab**.
- 4 If you want the file to have a header row, click **Export a Row of Column Headers**.

- 5 In the **Which Markers** area, click **Selected Marker only** to export only the occurrences for the selected marker. To export the occurrences for all markers, click **All Markers**.
- 6 You may set the columns for each row in the **What to Export for Each Marker Occurrence** area. For more information on exporting marker data, see [“Export Markers” on page A-31](#).
- 7 In the **Output File** area, in the **File** box, type or select the output file name.
- 8 In the **Output File** area, click the **Append if existing** checkbox to append the marker data onto the end of a file that already exists on disk. Otherwise, CinePlex Editor overwrites the existing file.



CAUTION

Set the **Append if existing** checkbox correctly

Pay special attention to the **Append if existing** checkbox.

If it is *checked*, the new marker data will be appended to the existing file.

If it is *unchecked*, the new export file will overwrite the current export file.

- 9 Click **Export!** to create the file and close the dialog box. The **Export Complete** dialog box appears.

3.12 Exporting Marker Occurrences Data as a PLX File

CinePlex Editor can export marker occurrences data along with spike and continuous data read in from the original PLX neural data file to a new PLX file.

Note: This section does not apply when neural data is read from a PL2 file. Exporting to PL2 is not available at this time.

Mapping Markers to Event IDs

When exporting to a PLX file, the marker occurrences in the project are represented as external events (type 4 data) in the output PLX file. There are two kinds of external events in the PLX file format:

- 1 Individual External Events – These events appear only by their Event ID, and each occurrence includes a timestamp only. There can be many different Individual External Events (with different Event IDs) present in a PLX file.
- 2 Strobed Events – These events appear only by a special Event ID, so only one strobed event can be in a PLX file. Each occurrence of a strobed event stores a timestamp plus a single 16-bit value, called the strobe code.

You must define a mapping between markers and Event IDs before CinePlex Editor can represent marker occurrences as external events.

Each marker for which the marker occurrences are to be exported to a PLX file must have its own unique Event ID. You may define or edit the Event IDs in the **Define New Marker** or **New Marker Occurrence** dialog boxes (see [“Editing](#)

3 Markers and Marker Occurrences

[Markers and Marker Occurrences” on page 3-29](#)), or you may change them in the **Export To PLX** dialog box (see [“Export to PLX” on page A-34](#)).

The fact that individual external events do not have any data values associated with them means that only Time-Only, Frame, and Interval-type (Interval, Level Interval, or Zone Interval) markers can be represented by using individual external events. For Interval-type markers, specify two Event IDs, one to represent the start time of the interval and one to represent the end time.

Furthermore, the fact that a PLX file can only contain one kind of strobed events means that only a limited number of Scalar or Coordinates markers can simultaneously appear in a single PLX file. For example, if the strobed events in a PLX file are to represent all the occurrences of a certain Scalar marker, then there is no way to represent another scalar marker or any coordinates markers in the same PLX file.

Because of the existence of the VideoTracker protocol, coordinates markers can be represented in a PLX file. Up to three coordinates markers can be represented using the VideoTracker protocol in a single PLX file, along with an additional scalar marker.

3.13 Exporting Marker Occurrences Data as a NEX File

CinePlex Editor can export marker occurrences data along with spike and continuous data read in from the original neural data file to a new NEX file. For information on mapping from markers to NEX variables, see [“Export to NEX” on page A-36](#).

Chapter 4

Using the Freezing Detector, Levels Editor and Zones Editor

4.1 Using the Freezing Detector.....	46
4.2 Using the Levels Editor	56
4.3 Using the Zones Editor	60

4 Freezing Detector, Levels Editor and Zones Editor

This chapter explains how to use the tools that CinePlex[®] Editor provides for

- Detecting animal freezing behavior—See [Section 4.1, “Using the Freezing Detector” on page 46](#)
- Identifying times during which a measured scalar parameter meets a specific user-defined level—See [Section 4.2, “Using the Levels Editor” on page 56](#).
- Identifying times during which a specified coordinate marker entered and left a defined zone—See [Section 4.3, “Using the Zones Editor” on page 60](#)

4.1 Using the Freezing Detector

You can use the Freezing Detector to detect animal “freezing” behavior and insert marker occurrences for each set of freezing episodes.

Understanding how the Freezing Detector works

An active, normally behaving animal might stop moving for a period of time (freeze) due to anxiety or fear or a specific stimulus. With the Freezing Detector function, you can define parameters that enable the system to detect and display periods of animal freezing behavior. You can average the Motion Measure, set the freezing threshold, span gaps between closely spaced events, then generate markers around the freezing episodes that result. Multiple sets of detected freezing episodes can be created with varying parameters, reviewed, modified if needed, and saved for future use in the CPJ project file.

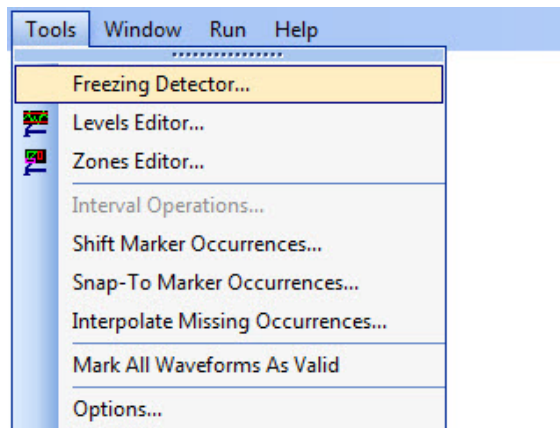
Note: The Motion Measure is the normalized contour difference of the animal's body computed on a frame-by-frame basis. The Freezing Detector averages (smooths) the Motion Measure data within a user-specified time window (**Averaging Wnd** parameter) and compares the averaged motion data to a user-specified threshold value and minimum freeze duration value.

Note: Motion Measure data can be created during a CinePlex Studio recording (or re-recording) session only with the Object Contour tracking method. See *CinePlex Behavioral Research System User Guide Version 3*, available at www.plexon.com for information about this tracking method.

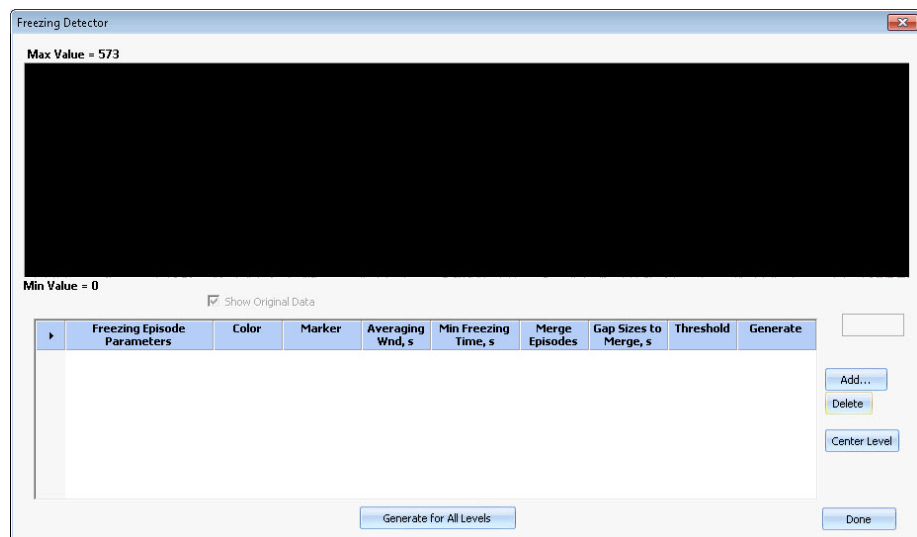
See also “[Examples of Freezing Detector parameters and results](#)” on [page 53](#) following the procedure.

Opening and using the Freezing Detector dialog box

- 1 To open the **Freezing Detector** dialog box, from the **Tools** menu, click **Freezing Detector**.

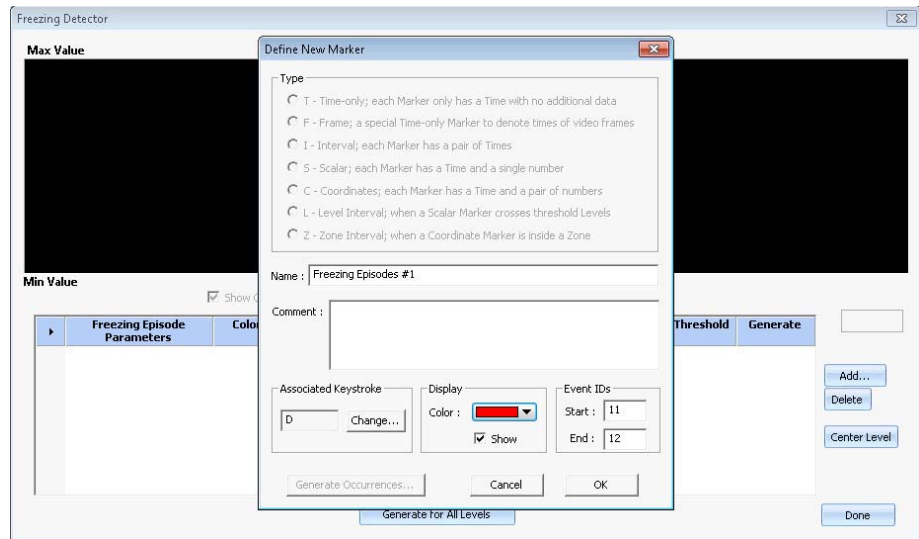


The **Freezing Detector** dialog box opens.



4 Freezing Detector, Levels Editor and Zones Editor

- 2 Click the **Add** button. The **Define New Marker** dialog box opens.

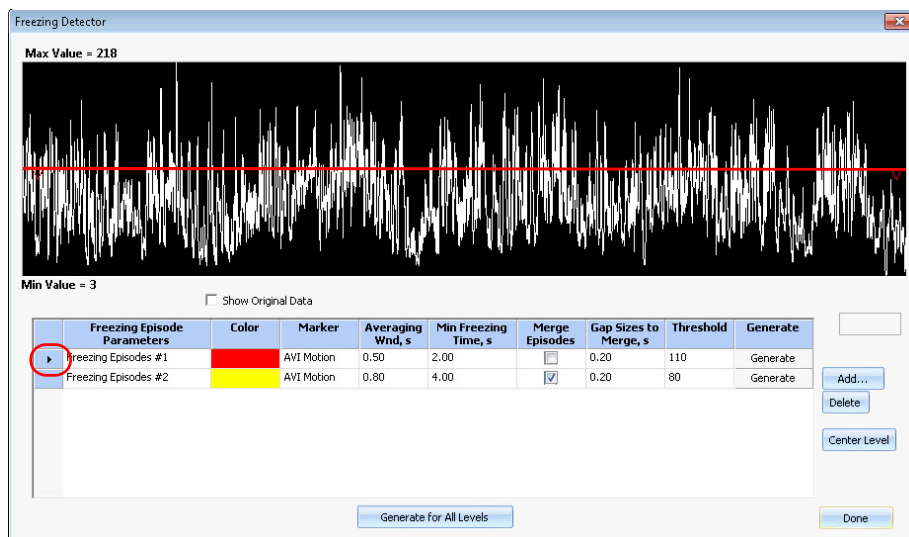


Note: The **Type** area of the dialog box (above) is grayed out because the system recognizes that you are creating a freezing episodes marker.

Every marker you create will automatically be displayed in the **Markers** and **Input from Marker Selected** windows. If you select the **Show** checkbox, the marker will be displayed in the Activity window also.

- 3 Use the options in this dialog box to set parameters that affect how the system detects and displays data in the **Freezing Detector** dialog box:
 - **Name**—Enter a name for this set of freezing markers, for example, Freezing Episodes #1.
 - **Comment**—Optional text field.
 - **Associated Keystroke**—A single letter that you will use if you want to manually create a freezing marker.
 - **Display**—The color to associate with the freezing marker (for easier identification in the display), and a **Show** checkbox to specify whether the marker will be displayed in the Activity window.
 - **Event IDs**—The start and end identifiers for each freezing episode.
- 4 Click **OK**.

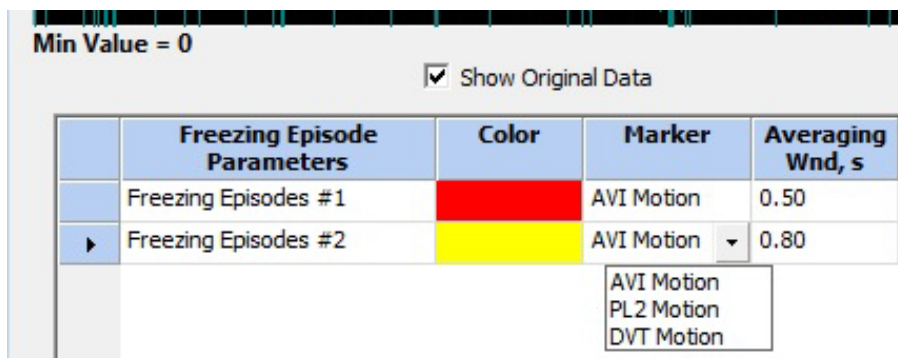
The new freezing data appears in the **Freezing Detector** dialog box. A typical display is shown in the image below.



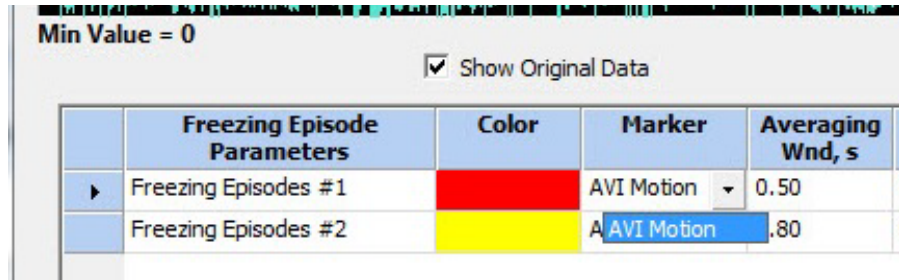
The **Freezing Detector** dialog box displays the following data and options:

- **Black triangle** in the left margin of the dialog box (see the red highlighting in the diagram, above)—Click on a row in the table to select it; the triangle in the left margin shows that the row is selected, and the graph displays the data for the selected row.
- **Color**—The user-specified color associated with the marker. You can change a color by clicking on it and selecting a new color from the droplist.
- **Marker**—The type of file that the system uses to obtain the Motion Measure data. As shown in the images below, the system provides a dropdown menu displaying the type(s) of source files available in your project file (CPJ file).

The first image shows a dropdown list that would appear when the CPJ file contains AVI, PL2 (or PLX) and DVT files with Motion Measure data present. The second image shows a list that would appear when the CPJ file contains only AVI files.



4 Freezing Detector, Levels Editor and Zones Editor

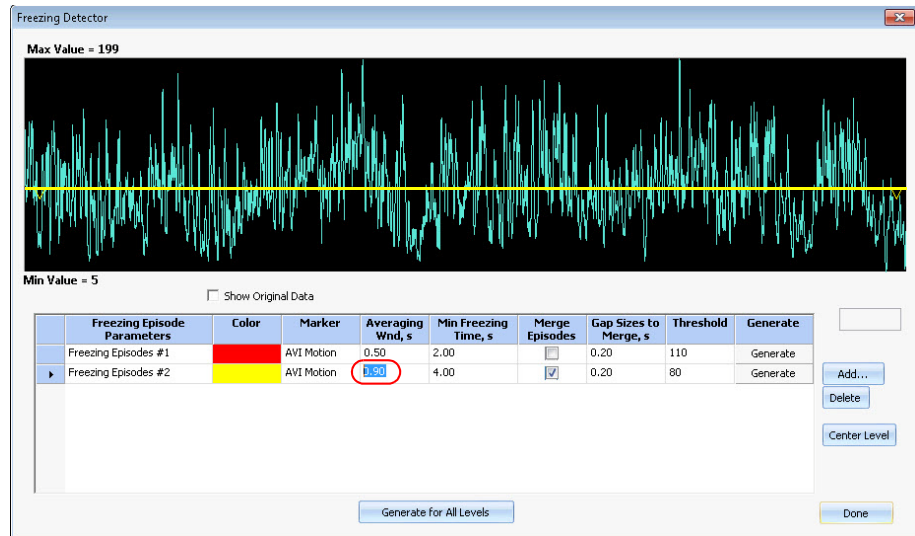


	Freezing Episode Parameters	Color	Marker	Averaging Wnd, s
▶	Freezing Episodes #1		AVI Motion	0.50
	Freezing Episodes #2		AVI Motion	.80

Note: For the Freezing Detector function to be used, the AVI, DVT or PL2 (or PLX) file you select must contain Motion Measure data, as explained earlier in this section.

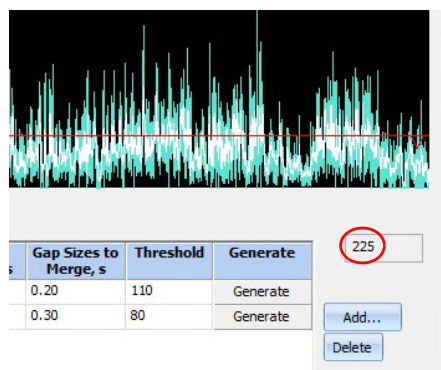
- **Averaging Wnd (Window)**—The time period, in seconds, over which the system averages the animal's movement. You can change this value by double clicking the number in the table and typing a new value. The averaging calculation smooths the motion data during the specified time period. A larger window provides more smoothing effect than a smaller window. The Averaging Wnd size can be adjusted between 0.1 and 10.0 seconds (default 0.5 seconds).
- **Min Freeze Time**—The minimum time duration that the animal's movement must be less than the user-defined Threshold to be considered a freezing episode; if this time duration is exceeded, a freezing episode has occurred and the system generates a freezing marker instance. You can change this value by double clicking the number in the table and typing a new value. The Min Freeze Time can be adjusted between 0.1 and 10.0 seconds (default 2.0 seconds).
- **Merge Episodes**—If you select this checkbox, the system merges two freezing episodes into a single episode even if there is a short active gap between the freezing episodes (see **Gap Sizes to Merge**, below). You can select/deselect this checkbox by clicking on it.
- **Gap Sizes to Merge** (used only if the **Merge Episodes** checkbox is selected)—Specifies the active gap size, which is the time, in seconds, during which the animal's averaged motion data can exceed the Threshold value between freezing episodes and still identify the two freezing episodes as a single merged episode. You can change this value by double clicking the number in the table and typing a new value. The gap size can be adjusted between 0.1 and 10.0 seconds (default 0.2 seconds).
- **Threshold** value (in the table) and horizontal line (in the graphical display)—In the above image, the horizontal red line is set to the user-defined threshold for Freezing Episodes #1. You can raise or lower this threshold by clicking and dragging the horizontal line with the PC mouse or by double clicking the **Threshold** value in the table and typing a new value.

Note: The image below shows an example of changing a parameter value by double clicking it and entering a new value. In this example, the user has entered a new value for the **Averaging Wnd** in the second row of the table:



- **Generate** button—Generates new freezing marker occurrences in the Activity window. This button generates new results for a single row of freezing episodes in the table.

You can also click the **Generate for All Levels** button to generate new freezing marker occurrences in the Activity window. This button generates new results for all freezing episodes rows in the table.
- **Show Original Data**—If this checkbox is selected, the window displays the original motion measure data (the amount of positional change by the center of gravity of the animal from one video frame to the next) along with the averaged (smoothed) freezing measure data.
- **Cursor position readout**—The rectangle on the right side of the dialog box (see the image below) displays a numerical value as you move the cursor within the graphical display area. The numerical value is the vertical amplitude of the data corresponding to a specific timestamp (horizontal position) within the graphical display. This box is empty if the cursor is not within the graphical display area.

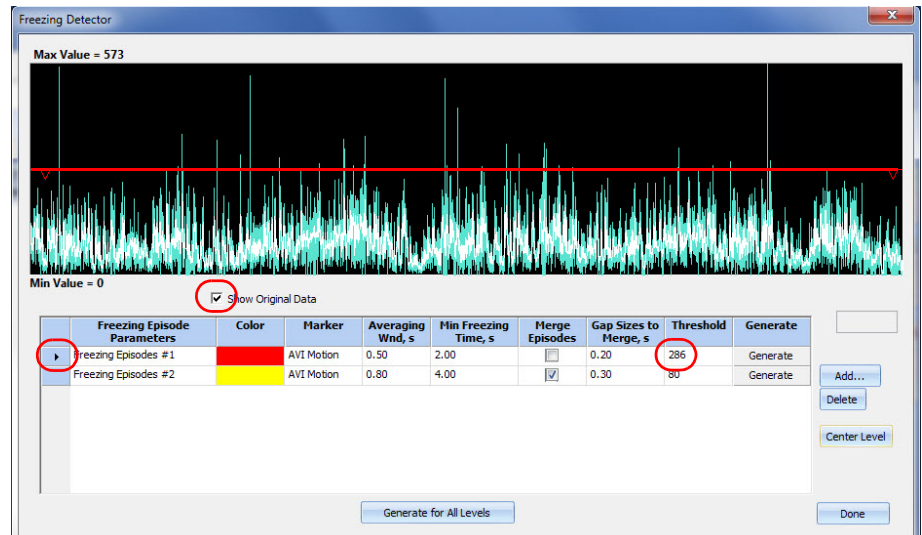


- **Max Value** and **Min Value** and graphical display—This area plots the freezing measure data and the original Motion Measure data (if the Show Original Data checkbox is selected). It also displays the maximum and minimum numerical values of the graphical data.
- **Add** button—Opens the **Define New Marker** dialog box, which allows you to add another Freezing Episodes marker.

4 Freezing Detector, Levels Editor and Zones Editor

- **Delete** button—Deletes the selected row in the table.
- **Center Level** button—Changes the Threshold value to the average of the **Max Value** and **Min Value** of the plotted data.

In the first image below, the **Show Original Data** checkbox is selected, and clicking on the **Center Level** button changes the Threshold level to the mean of the **Min Value** and **Max Value** for the original data.

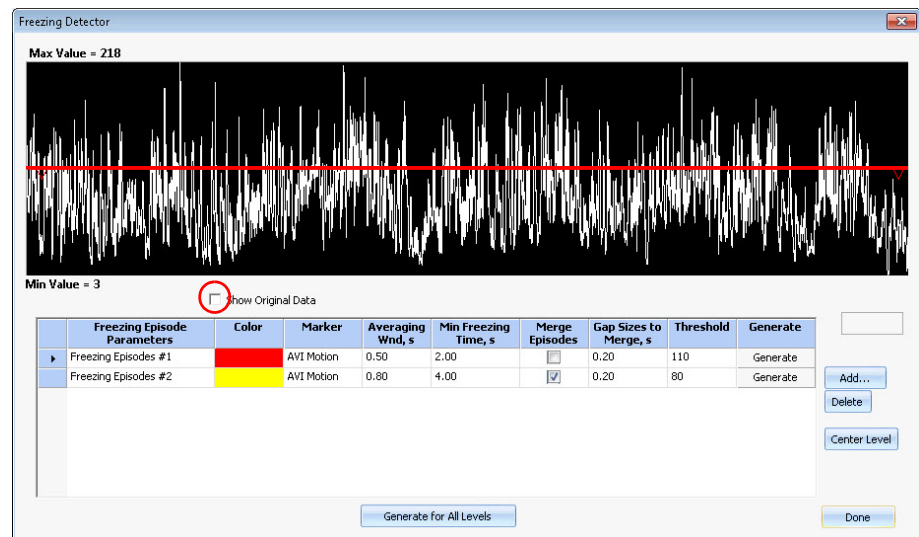
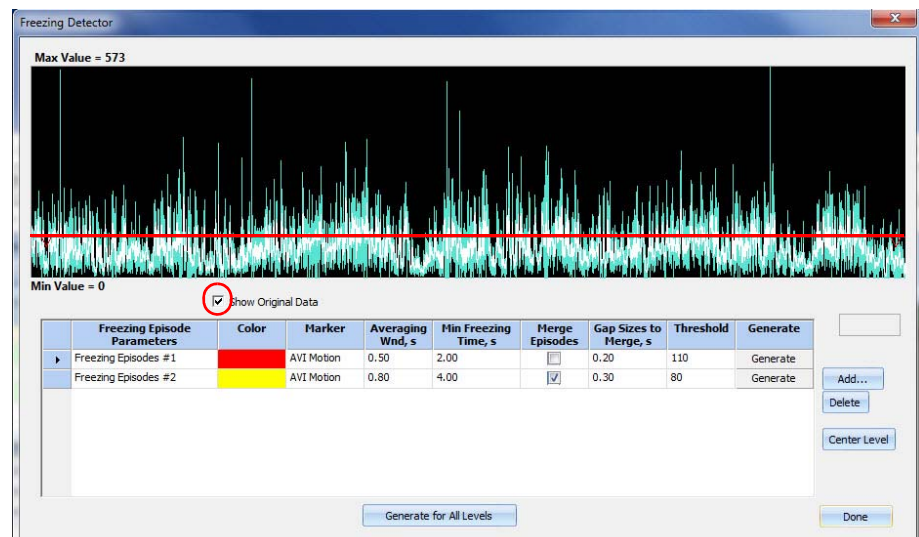


In the second image, the checkbox is deselected and only the averaged data for the selected row is plotted; in this case, clicking on the **Center Level** button changes the Threshold level to the mean of the **Min Value** and **Max Value** for the averaged (smoothed) data. (You can modify the Threshold value manually by double clicking on the number in the Threshold box and entering a new value.)



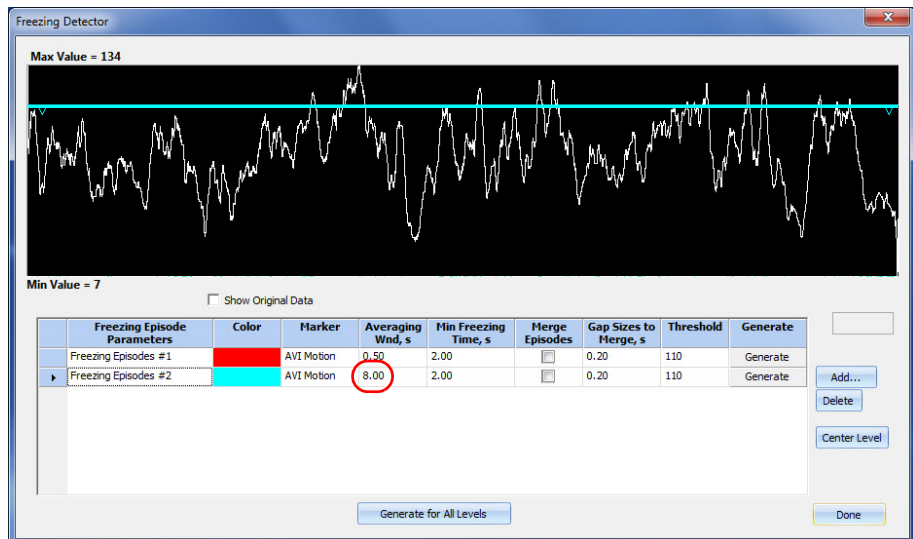
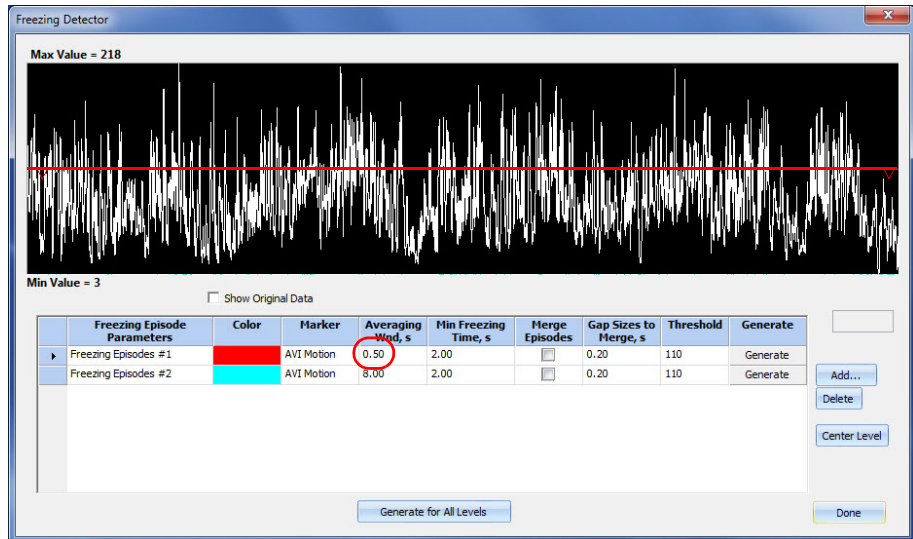
Examples of Freezing Detector parameters and results

The two images below show the same data. In the first image, the **Show Original Data** checkbox is selected; in the second image, it is not selected:

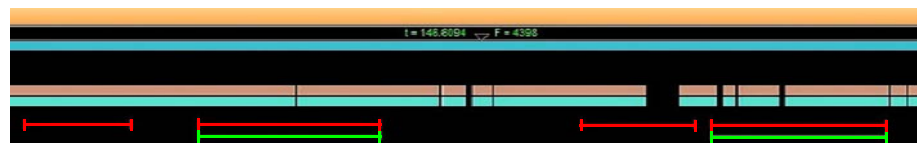
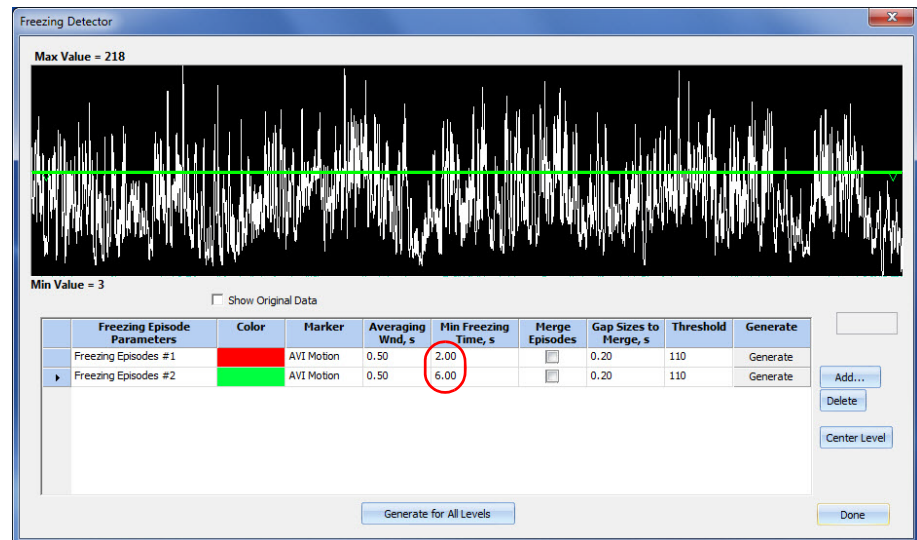


4 Freezing Detector, Levels Editor and Zones Editor

The images below show two sets of freezing calculations for the same data. For Episodes #1, **Averaging Wnd** is set to 0.50 second; for Episodes #2 it is set to 8.00 seconds. Note that the averaged (smoothed) data is different for these two cases, even though the original motion data is the same:



The first image below shows two sets of freezing episodes for the same data. For Episodes #1, the **Min Freezing Time** is set to 2.00 seconds; for Episodes #2 it is set to 6.00 seconds. The second image shows a portion of the Activity window after the **Generate for All Levels** button is pushed. Note that freezing episodes with a shorter freeze time (< 6.00 seconds) are marked only for the Episodes #1 function (red line), not the Episodes #2 function (green line):



4 Freezing Detector, Levels Editor and Zones Editor

4.2 Using the Levels Editor

You can use the Levels Editor to define Level Interval markers and insert marker occurrences for them. Level Interval marker occurrences indicate the time intervals during which the values of a Scalar marker satisfied some condition. You may use the Levels Editor to set up the conditions, apply the conditions to a specific Scalar marker, and generate occurrences of the selected Level Interval marker or markers.

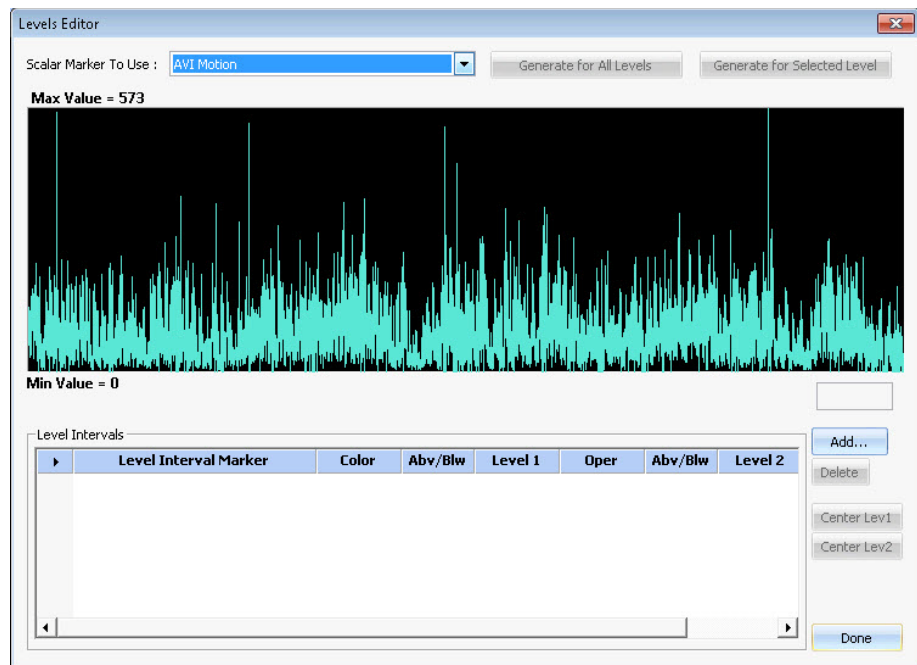
Level Interval markers are like Interval markers, but they are extended to store additional information that defines a condition. This additional information appears with the Level Interval marker definition in the CPJ file. The occurrence of a Level Interval marker is always tied to the values of the occurrence of a Scalar marker.

For the examples in this section, the **Motion** Scalar marker is used, but you can use the Level Interval marker with any Scalar marker.

To use the Levels Editor

- 1 On the **Tools** menu, click **Levels Editor** or click the **Edit Levels** button on the toolbar.

The **Levels Editor** dialog box opens.

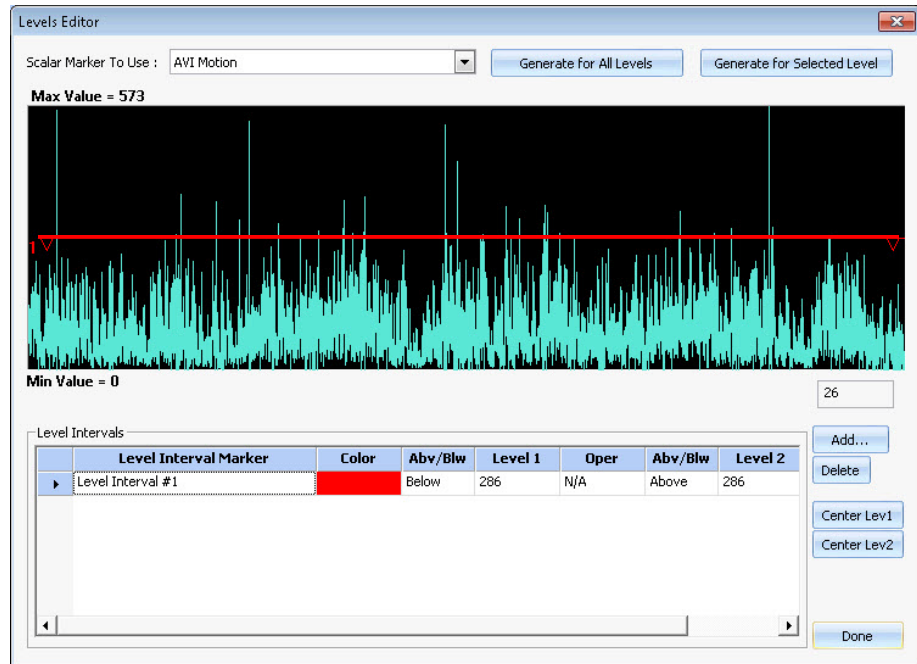


- 2 To define a new Level Interval marker, click **Add**.

The **Define New Marker** dialog box ([“Define New Marker” on page A-13](#)) opens to enable you to customize the general properties of the new **Level Interval** marker.

- 3 Define the new marker and click **OK** to close the **Define New Marker** dialog box.

A new row appears in the **Level Intervals** box.

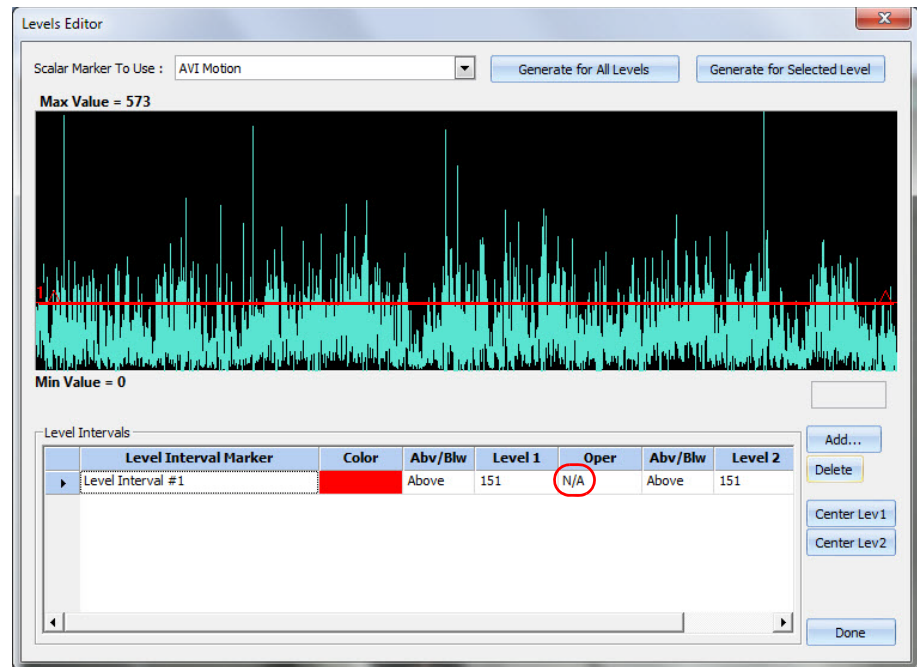


- 4 Double click on the parameters in the table to specify the levels you want for this marker. (The parameters become editable when you double click on them.)

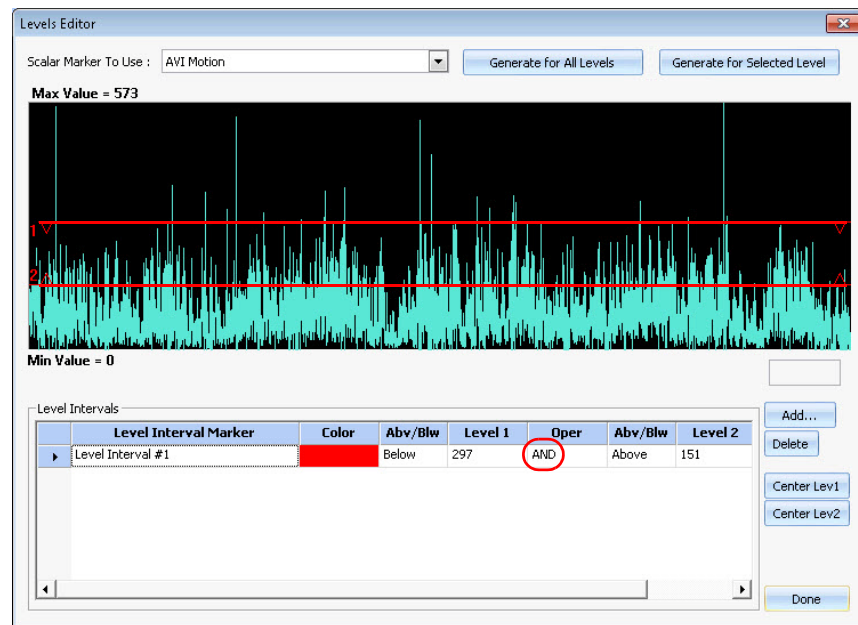
For each Level Interval, you can specify either a one-level or two-level setting. When one level is used, **N/A** appears in the **Oper** field. When two levels are used, a logical operator is placed between the two levels (**AND** or **OR** is selected in the **Oper** field).

4 Freezing Detector, Levels Editor and Zones Editor

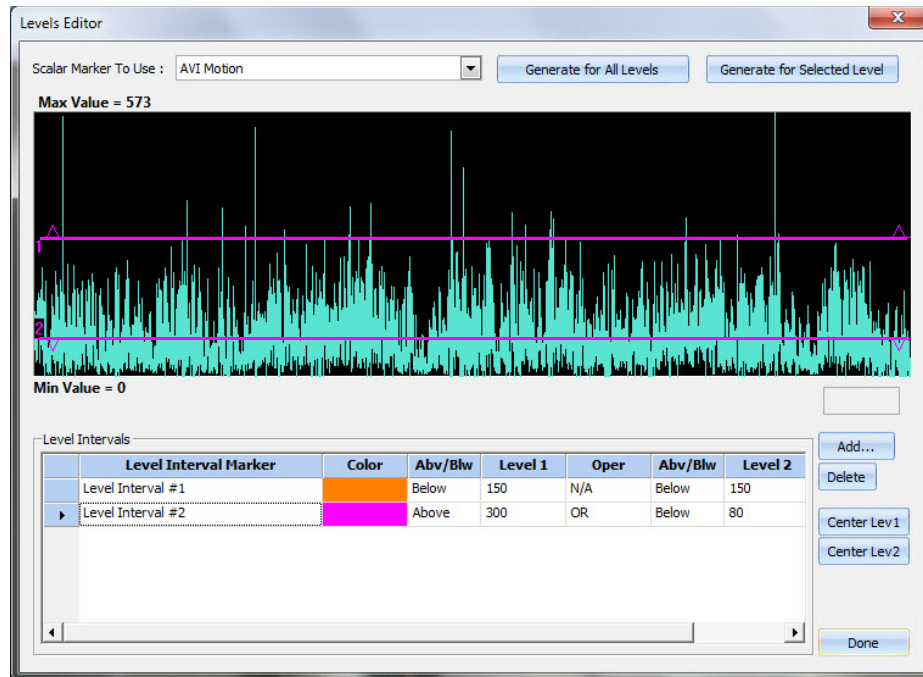
In this example, a marker will be generated when the actual value of the animal's motion is above 151.



In this example, a marker will be generated when the actual value of the animal's motion is between 151 and 297.



- 5 You can define additional **Level Interval** markers by following the same procedure as in [Step 2](#) through [Step 4](#). In the following example, two different **Level Interval** markers are specified. The graph displays the levels for the row that is selected in the table.



Generating new Level Intervals results in the Activity window

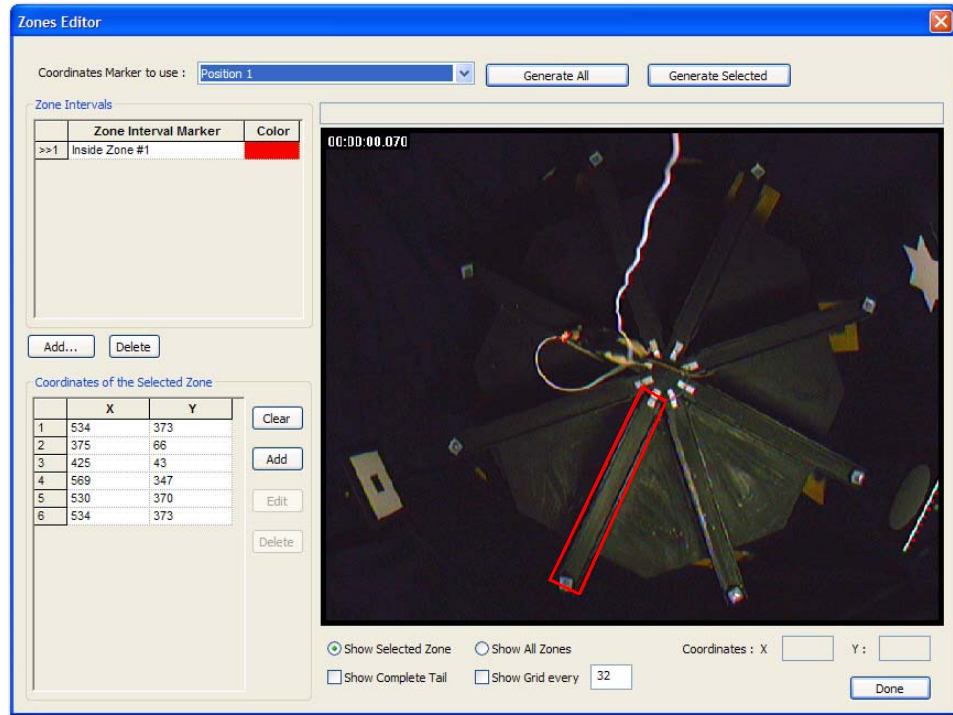
- 6 Click the **Generate for All Levels** or **Generate for Selected Level** button to generate new Level Interval marker occurrences in the Activity window.

The **Generate for All Levels** button generates new results for all Level Interval rows in the table. The **Generate for Selected Level** button generates new results only for the selected Level Interval row in the table (that is, the row with the triangle appearing in the left margin of the row).

4 Freezing Detector, Levels Editor and Zones Editor

4.3 Using the Zones Editor

You may use the Zones Editor to define Zone Interval markers and generate marker occurrences for them. To open the **Zones Editor** dialog box, on the **Tools** menu, click **Zones Editor** (or click the **Edit Zones** button on the toolbar):



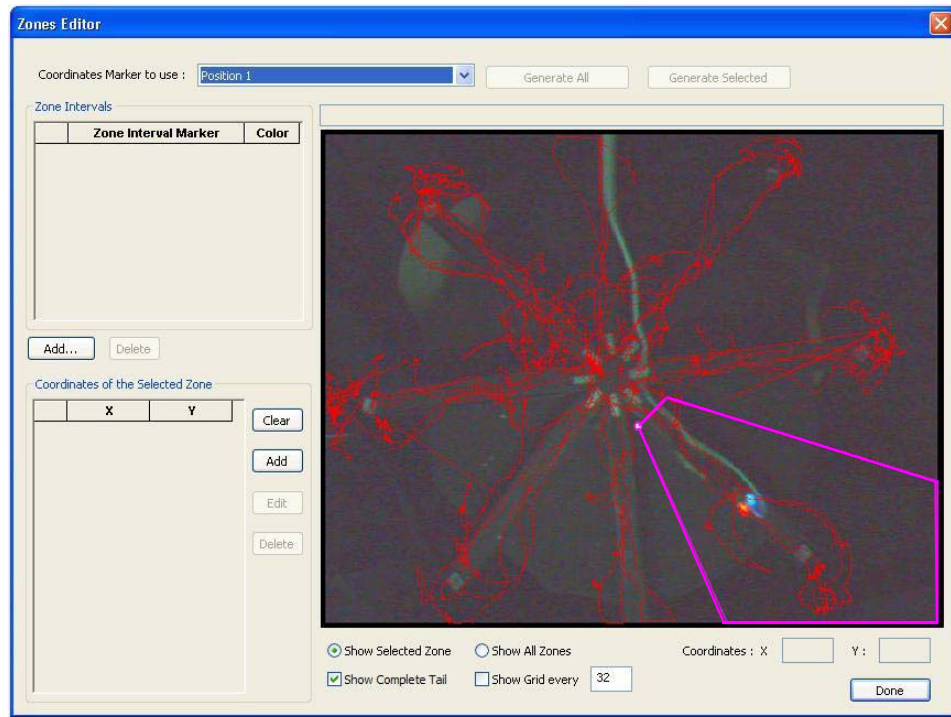
Zone Interval Markers

Zone Interval marker occurrences indicate the time intervals during which a Coordinate marker occurrence remains inside a Zone that is defined. You may use the **Zones Editor** dialog box to define the Zones, to search for the times when the specified Coordinate marker entered and left the defined Zones, and generate Zone Interval marker occurrences.

Zone Interval markers are Interval markers, but they are extended to store additional information that defines a Zone. This additional information appears with the Zone Interval marker definition in the CPJ file. A Zone is an ordered list of coordinates that are connected with line segments, to form a closed Zone. Zone Interval marker occurrences are always tied to the values of the occurrence of a Coordinates marker.

The coordinate system for all Coordinate markers, and therefore also for all Zone definitions, range from (0,0) to (1023,767), with (0,0) representing the lower left

corner of the image. If the video resolution is other than 1024x768, which is usually the case, the coordinates are linearly mapped onto the video.



To use the Zones Editor

- 1 On the **Tools** menu, click **Zones Editor**.

The **Zones Editor** dialog box opens.

- 2 To define a new Zone Interval marker, under the **Zone Intervals** area click **Add**.

The **Define New Marker** dialog box (see [“Define New Marker” on page A-13](#)) opens to enable you to customize the general properties of the new Zone Interval marker.

- 3 Define the new marker and click **OK** to close the **Define New Marker** dialog box.

A new row appears in the **Zone Intervals** box.

Note: Immediately after you create a new Zone Interval marker, Zones Editor enables you to click in the video window to set the **X** and **Y Coordinates of the Selected Zone**. The box directly above the video then contains this text:

Left-Click on the view to add a new coordinate; Right-Click to end

- 4 Move the mouse pointer into the **Zones Editor** video area.

The mouse pointer changes to crosshairs and the current pointer location coordinates appear under **X** and **Y** in the **Coordinates of the Selected Zone** area.

4 Freezing Detector, Levels Editor and Zones Editor

- 5 Move the pointer to the desired location for the first coordinates of the selected Zone. Click to add the first coordinates.

The first set of coordinates appear as line **1** in the **Coordinates of the Selected Zone** box and line **2** indicates the current pointer position.

Note: As you move the mouse pointer, a line follows it from the first coordinates to its current location. The current location always appears as a small circle with a white interior.

- 6 Move the pointer to the desired location and click again to add the second set of coordinates, and so on. Stop entering coordinates when the next set would be the starting point.

- 7 Click the right mouse button.

The Zones Editor automatically closes the Zone by making the last coordinate the same as the first coordinate.

You may select a point at a vertex of a selected Zone Interval by clicking on a line in the **Coordinates of the Selected Zone** box. The point you select appears with a >> in the leftmost column box and as a small circle with a white interior in the video area.

After you have defined the Zones, you may generate Marker occurrences just for the selected Zone Interval marker, or for all Zone Interval markers by clicking **Generate Selected** or **Generate All**.

Chapter 5

CinePlex Editor Examples and Use Cases

5.1 Printing	64
5.2 Denoting Interesting Behavior In the Video	64
5.3 Invalidating Artifact Waveforms	65
5.4 Entering a Coordinates Marker to Track Animal Movement.....	67
5.5 Repairing Tracking Coordinates by Replacing Coordinates Marker.....	68
5.6 Simple Place Cell Analysis	69

5 CinePlex Editor Examples and Use Cases

This chapter contains suggested procedures for several common operations in CinePlex® Editor. These procedures are by no means meant to be an exhaustive list of what can be done with CinePlex Editor, nor are they intended to be a presentation of the only possible way to achieve any desired end result.

Note: The following procedures assume a project has already been created and that it is currently open. For details on how to create CinePlex projects, see [Section 2.2, “Setting Up a New Project” on page 7](#).

5.1 Printing

Several windows in CinePlex Editor support rudimentary printing. To print a specific window, click in the window so the title bar is highlighted. If the window supports printing, the **Print** and **Print Preview** items on the **File** menu are available. The **Input** and **Scalar** windows do not support printing.

5.2 Denoting Interesting Behavior In the Video

A basic use for CinePlex Editor is to introduce a new marker occurrence into the data each time an animal or other subject in the video performs an action that is of interest in an experiment. For example, perhaps a neuron is suspected to be associated with a rat deciding to get a drink of water. You might test this hypothesis by introducing a time marker into the data whenever the rat drinks his first sip of water, as shown by the video. Then it would be desirable to perform a peri-event analysis against this new event in NeuroExplorer® to see if any neurons are associated with the first sip.

The procedural approach here is to define a new Time-only marker, then enter marker occurrences whenever the rat starts to sip water. Initially, we *rough in* all the marker occurrences during one continuous pass through the video, then we go back and adjust each marker occurrence to be as accurate as possible. Then this information is saved to a NEX file, from which we can easily load it into NeuroExplorer for analysis.

Denoting interesting behavior in the video

- 1 Define a new Time-only marker as described in [Section 2.4, “Defining a New Marker” on page 12](#). Label it “First Sip.” Assign a keystroke to it that is easy to press quickly.
- 2 Click **Play**. Adjust the **Faster** and **Slower** settings to a comfortable speed to view the video, which balances the desire to get through the video quickly against the risk of missing the behavior should it occur too quickly to spot.
- 3 Use the **Zoom In** and **Zoom Out** buttons at the bottom of the Activity window to adjust the time range such that, should the sip behavior be spotted in the video view, a key on the keyboard can be hit before the time of the first sip scrolls out of the **Activity** window.
- 4 In the Input window, at **Keystroke**, click **Insert** (You could just as easily use the **Left-click** or **Button** input methods here.). CinePlex Editor is now armed

- to enter new occurrences of the new marker when pressing that marker's associated key.
- 5 Click **Rewind**. Click **Play**. Position a finger over the associated keystroke for the "First Sip" event.
 - 6 When the sip behavior is observed, quickly press the key associated with the "First Sip" marker. Accuracy is not important at this point; fine-tuning will come later. Go through the entire video.
 - 7 Now, let's go back through and adjust the time of the "First Sip" marker occurrences to be more accurate. We will use the **Find** function to quickly locate our marker occurrences. In the Input window, after **Keystroke**, click **Find**.
 - 8 Rewind the video file, then press the assigned key for the "First Sip" marker. This causes the system to jump to the first marker occurrence. Use the left and right arrow keys on the keyboard to look at each frame of the video to decide where the sip actually occurs.
 - 9 In the Activity window, drag the marker occurrences to the correct time. To do so, press and hold the **SHIFT** key, then click near the tick mark for the marker occurrence. Drag the tick mark to the desired time and release the mouse button.
 - 10 To save the data, on the **File** menu, click **Export to NEX**, and if desired, select the appropriate **What to Export** checkboxes. Click **Export!** to write the file.

5.3 Invalidating Artifact Waveforms

Artifact waveforms can occur, for example, because a rat rapidly shakes its head. This behavior can easily be spotted in the video view, and it generally produces a cluster of spikes and large voltage deviations in a continuous data channel. It is desirable to invalidate all spike waveforms that occur during each head-shaking episode, and save the data to a new PLX file that does not contain those invalidated waveforms. This file can then be loaded into Offline Sorter™ and sorted.

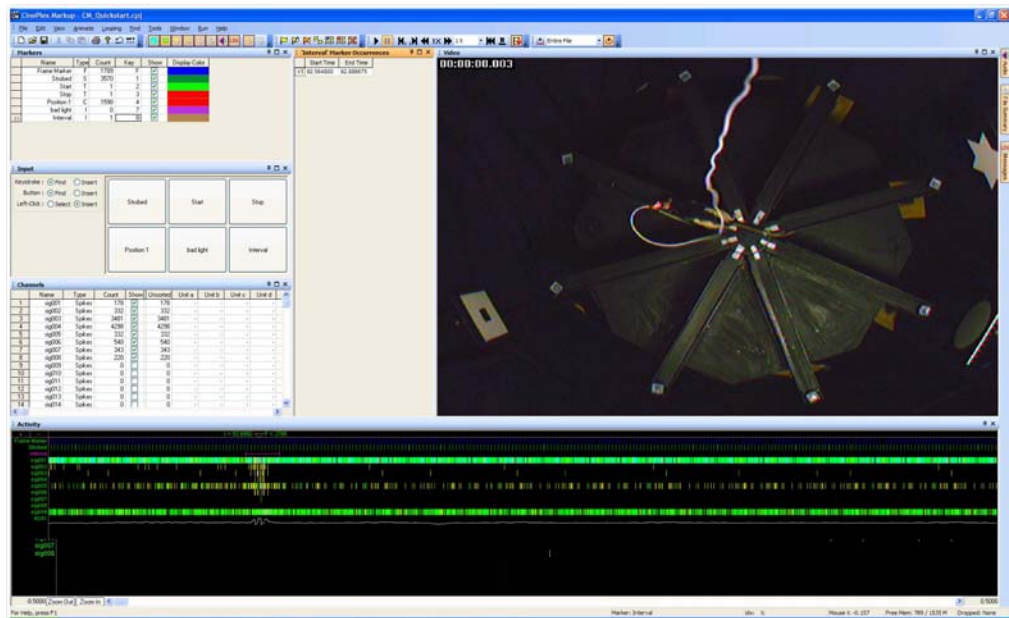
Note: This section does not apply when neural data is read from a PL2 file. Exporting to PL2 is not available at this time.

The procedural approach here is to define a new Interval marker, whose occurrences start and end when the head-shaking episodes start and end. We then use this Interval marker to invalidate the spike waveforms that occur within the head-shaking episodes. We then save the data to a new PLX file minus the invalidated spike waveforms.

5 CinePlex Editor Examples and Use Cases

Invalidating artifact waveforms

- 1 Define a new Interval marker (see [Section 2.4, “Defining a New Marker” on page 12](#)). Label it “Head Shake”. Make sure that the new marker is the currently-selected marker.
- 2 In the **Channels** window (see [“Channels Window” on page A-17](#)), click **Show** for the spike and continuous channels that are the best indicators of when this artifact occurs, which makes them appear in the Activity window.
- 3 Use the **Zoom Out** button at the bottom of the Activity window to expand the time range as much as possible, which helps to examine the file quickly. However, do not expand the range so far that the artifact cannot be spotted should it occur.
- 4 In the Input window, at **Left-Click**, click **Insert** (Or use the **Left-click** or **Button** input methods here). CinePlex Editor is now *armed* to enter new occurrences of the new marker when pressing that marker’s associated key.
- 5 Starting at the beginning of the file, click **Play**. If it doesn’t make the behavior too difficult to spot as it scrolls by, increase the speed of the playback so that the file can be reviewed quickly.
- 6 When the head shake behavior is observed, quickly press **SPACEBAR** to pause the playback. Use the left and right arrows to single-step the frames to verify the head shake and decide when the head shake behavior begins and ends.
- 7 In the Activity window, left-click at the starting and ending times of the head shake episode. This inserts new marker occurrences of the “Head Shake” marker.



- 8 Press **SPACEBAR** to resume playing. Repeat Steps 6, 7, and 8 for each head shaking episode until the end of the file is reached.
- 9 From the **Tools** menu, click **Interval Operations**. Select the “Head Shake” marker from the **Interval Marker to Use** list. Click **Invalidate Waveforms that occur within the Intervals**. Click **OK**.
- 10 Now all of the spikes that occur within the head shake episodes have been invalidated. To hide invalidated spikes in the Activity window, open the right-click menu and click **Hide Invalidated Spikes**.
- 11 To save the data, from the **File** menu, click **Export to PLX**. Verify that the **Export invalidated spikes** checkbox is clear (the default). If desired, check or clear the **Write?** checkboxes for any markers that should be exported or not exported into the new PLX file. Click **Export!** to write the file.

5.4 Entering a Coordinates Marker to Track Animal Movement

Suppose that it is desirable to track the movement of some subtle feature on the video image—Something that CinePlex Studio cannot track automatically, like the position of the tip of a rat's tail.

The procedural approach here is to define a new **Coordinates** marker, and use the Video window to enter—by mouse click—the coordinates that populate the new marker. Then, you can use the **Interpolate Missing Occurrences** tool to fill in the in-between frames.

Entering tracking coordinates

- 1 Define a new **Coordinates** marker (see [Section 2.4, “Defining a New Marker” on page 12](#)). Label it “Tail Position”.
- 2 In the Input window, after **Left-Click**, click **Insert**. CinePlex Editor is now “armed” to create a new occurrence of the “Tail Position” marker whenever clicking in the **Video** window.
- 3 Decide how often coordinates need to be entered. The default case is to enter a Coordinates maker occurrence for each and every video frame. However, this means that the video must be advanced frame-by-frame, which can take a long time to do the tracking for an entire experimental run. If less accuracy is acceptable, it is possible to configure CinePlex Editor automatically to advance N video frames each time a coordinated is entered by clicking. This means that a “Tail Position” coordinate is entered only every N th frame, but transversing the file occurs N times faster. From the **Tools** menu, select **Options**, and click the **General** tab in the **Options** dialog box. Type the value

5 CinePlex Editor Examples and Use Cases

of N into the **Number of Frames to Advance During Click-To-Add** edit box. The default is $N = 1$, which enters a coordinate for every video frame.

- 4 Click **Play**, then **Pause**, then **Rewind** to return to the beginning of the file. This ensures that CinePlex Editor is ready to take new coordinates.
- 5 In the Video window, click at the position of the tip of the rat's tail. CinePlex Editor enters a new marker occurrence, and advances N video frames.
- 6 Repeat [Step 5](#) until all the data needed has been gathered.
- 7 When finished, in the Input window, at **Left-Click**, click **Select** to “disarm” CinePlex Editor.
- 8 It is possible to generate automatically new “Tail Position” marker occurrences for the skipped frames by interpolating the coordinates between the ones entered. This is similar to “key-frame” animation techniques. CinePlex Editor interpolates the coordinates mathematically with no regard for the video images—the interpolated positions may or may not match the actual positions of the rat's tail on the skipped video frames. To perform this operation, from the **Tools** menu, select **Interpolate Missing Occurrences**; for more information, see [“Interpolating Missing Marker Occurrences” on page 38](#). From the **Marker** list, select **Tail Position**. Because we want coordinates for every frame, in the **Timestamp Determination** area, click **Use Frame Marker Times**. Click **OK** to close the dialog box and enter the tracking coordinates.

5.5 Repairing Tracking Coordinates by Replacing Coordinates Marker

Suppose that CinePlex Studio is used to track an LED mounted to the headstage on a rat. Occasionally, the cable from the headstage can get between the LED and the camera, so the position data for the LED is missing in some frames. Or, suppose something caused the tracker to produce bad coordinates for a few frames, possibly caused by some light leaking into the experimental setup that confused the tracking algorithms.

In either case, the procedural approach is to put CinePlex Editor into a state where the video is advanced frame-by-frame and enter new or replacement tracker coordinates by clicking in the Video window at the desired location.

Repairing tracking coordinates

- 1 In the Markers window, select the Coordinates marker to repair. Click **Show**. To minimize confusion during the procedure, clear **Show** for other Coordinate markers (if present).
- 2 For the following procedure to work, the Coordinates markers must be aligned to the Frame marker times by using the **Snap-to Marker Occurrences** dialog box, for more information, see [“Snap-To Marker Occurrences” on page 37](#).

Follow the procedure outlined in that section to align the **Coordinate** markers to the Frame markers.

- 3 Locate a section of time that has bad or missing values for the selected Coordinate marker that needs to be repaired. Pause the playback at the first frame with bad or missing coordinates.
- 4 From the **Tools** menu, click **Options**, and in the **Options** dialog box click the **General** tab. Make sure that the selection in the **Number of Frames to Advance During Click-To-Add** box is 1 (the default). Also, from the **Animate** menu, select **Lock To Video Frames**.
- 5 In the Input window, at **Left-Click**, click **Insert**. This “arms” CinePlex Editor to enter new (or replace existing) marker occurrences when clicking the left mouse button in the **Video** window.
- 6 Position the mouse cursor where the new (or replacement) coordinate needs to be and click.
The position is entered (or updated) and the video automatically advances by one frame.
- 7 Repeat [Step 6](#) until all the coordinates are entered or repaired. Move the file forward to the next episode of bad tracking coordinates and repeat.
- 8 When finished, from the **File** menu, click **Save**. You may save and export the new or updated positions like any other marker data.

5.6 Simple Place Cell Analysis

Suppose it is suspected that a certain neuron seems to fire only when the rat is in his nest. As a procedural approach to test this hypothesis, a new Zone Interval marker could be defined that defines the boundaries of the rat's nest. The generated occurrences of this marker represent the intervals during which the rat was in its nest. NeuroExplorer could then be used to search for correlations between neural firing rates and this interval.

- 1 Advance the video until a frame shows where the outline of the desired Zone (the nest) is clearly visible.
- 2 Define a new Zone Interval marker (see [Section 3.3, “Defining Markers” on page 24](#)). Label it “Rat In Nest”. In the **Define New Marker** dialog box, click **Generate Occurrences** to open the **Zones Editor** dialog box (see [“Zones Editor” on page A-48](#)).
- 3 In the **Coordinates of the Selected Zone** area, click **Add** and then click the left mouse button repeatedly in the video window in order to define the outline of the nest. Before completely closing the contour, click the right mouse button, which closes the contour.
- 4 In the **Coordinates Marker to use** list, select the appropriate Coordinates marker, and click **Generate Selected**. This generates occurrences of the new “Rat In Nest” marker. Click **Done** to close the **Zones Editor** dialog box.
- 5 To inspect the “Rat In Nest” intervals, use the **Find Marker Occurrences** dialog box (see [Section 3.7, “Operating with Marker Occurrences” on page 34](#)) to quickly advance through all the occurrences of the “Rat In Nest”

5 CinePlex Editor Examples and Use Cases

marker. It is also possible to use the **Marker Occurrences** window to remove any undesirable “Rat In Nest” occurrences.

- 6 From the **File** menu, click **Export to NEX** (see [Section 5.2, “Denoting Interesting Behavior In the Video” on page 64](#)) to write the data to a NEX file for subsequent analysis. The “Rat In Nest” marker shows up as an interval variable in NeuroExplorer.

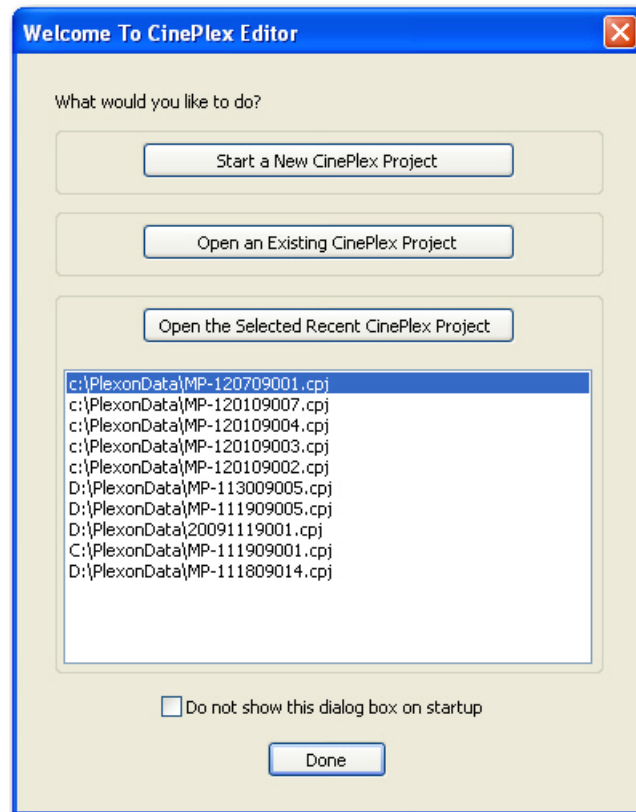
Appendix A

CinePlex Editor User Interface

A.1 Overview	A-2
A.2 Main Window	A-3
A.3 Menus	A-27
A.4 Toolbars	A-65
A.5 How CinePlex Editor Creates Initial Project Files	A-67
A.6 Marker Occurrences and the Marker Occurrences Window	A-70
A.7 Correcting for Video Latency with CinePlex System Version 2	A-72
A.8 Aligning Tracker Coordinates to Frames with CinePlex System Version 2	A-74
A.9 Interpreting Frame and Event Timestamps	A-77
A.10 Analyzing CinePlex Studio (Version 2) Data with NeuroExplorer	A-78

A.1 Overview

This appendix contains detailed reference information about menus, toolbars, dialog boxes, and windows for CinePlex® Editor. By default, the **Welcome To CinePlex Editor** dialog box appears when the CinePlex Editor software starts. This dialog box provides streamlined access to operations that are also available under the **File** menu.



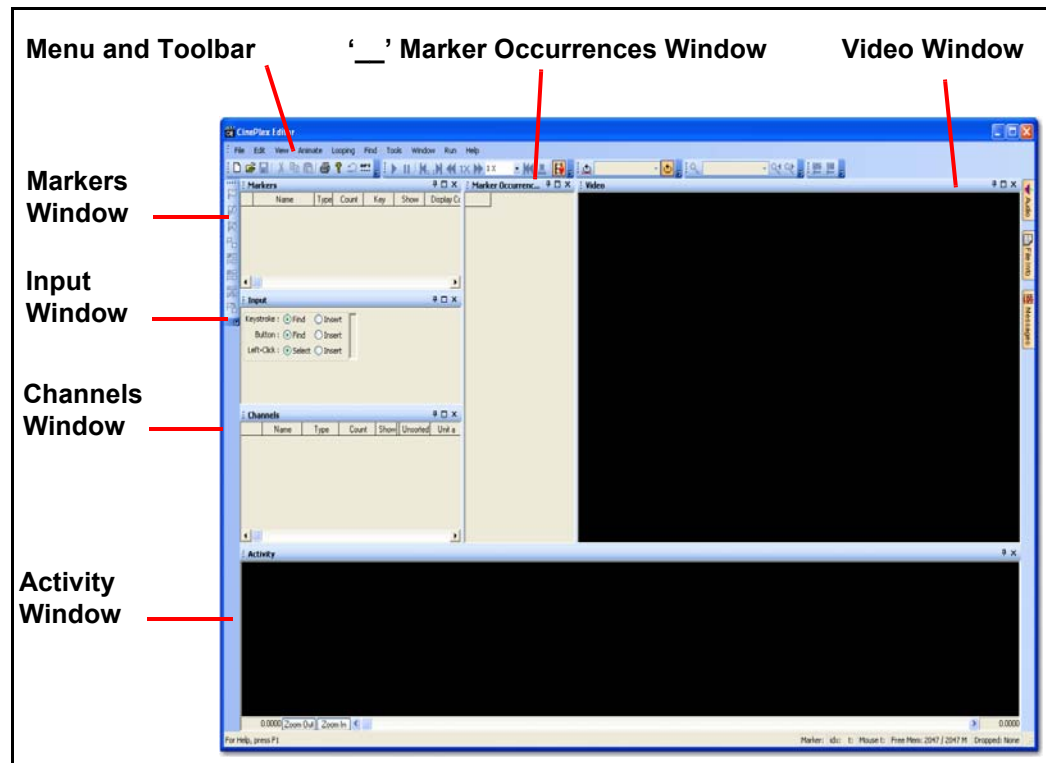
- **Start a New CinePlex Project** - This button starts the **New Project Wizard**, which assists in setting up a new CinePlex project. See “[New Project](#)” on page A-27.
- **Open an Existing CinePlex Project** - This button opens a file browser that allows selection of an existing CPJ file.
- **Open the Selected Recent CinePlex Project** - This button operates on the list box of the most recently used CPJ files. Select one and click **Open the Selected Recent CinePlex Project** to load that project. Alternately, double-click the project CPJ file in the list box to open it.

You can choose whether or not the welcomes dialog box appears after the CinePlex Editor software is started; to prevent the dialog box from appearing, click **Do not show this dialog box on startup**. To have the dialog box reappear,

from the **Tools** menu, click **Options**, click the **Display** tab, and select **Initially show 'Welcome To CinePlex' Dialog Box**.

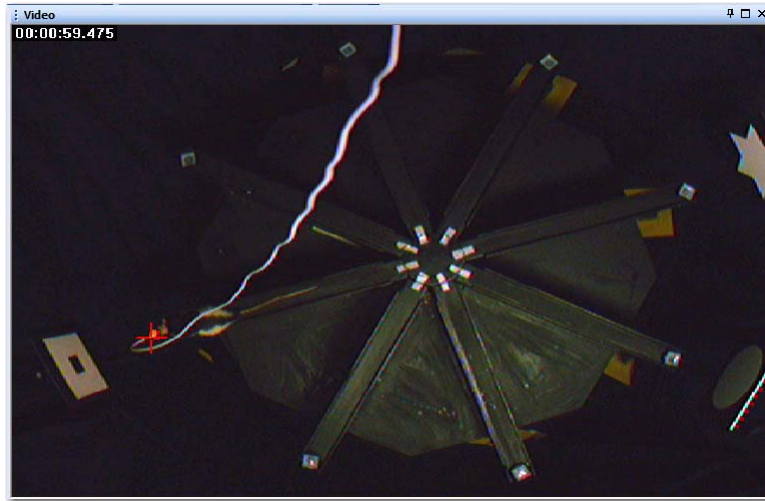
A.2 Main Window

This section describes the CinePlex Editor main window as shown below.



A.2.1 Video Window

The Video window by default is in the upper-right corner of the main window.



A.2.1.1 Function

The Video window displays the current frame of the video file. If the timecode and/or filename were inserted into the video, they are also displayed.

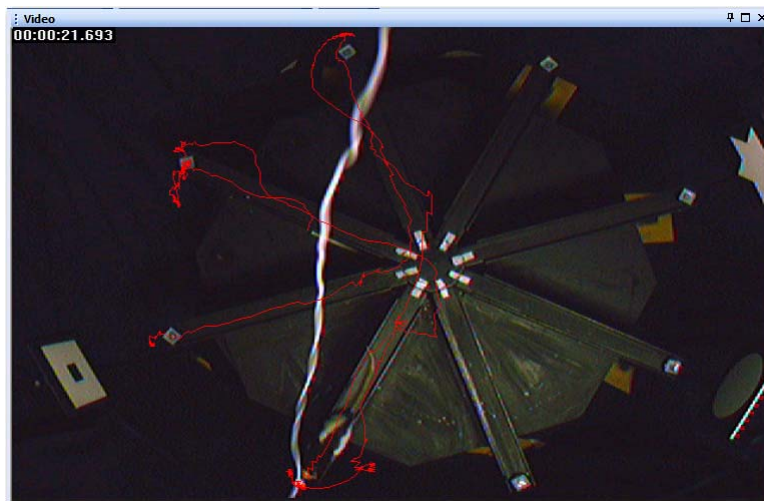
A.2.1.2 Features

Features of the Video window include:

- **Customizable Window** - You can customize the user interface. CinePlex Editor features a docking window architecture (see [“Windows” on page B-6](#)) that enables you to
 - float individual windows to any location
 - dock windows to various positions
 - close windows as needed
 - resize windows by clicking and dragging the splitter bars that divide them.
- **Resizable Video** - By default, the Video window stretches or shrinks the native video resolution (typically 640 X 480) to match the size of the Video window. You may also configure it to always show the video at its native resolution regardless of the size of the Video window by unchecking the **Resize Video to Fit Window** item on the right-click menu.
- **Coordinate Marker Crosshairs** - If coordinate markers are present with their **Show** checkboxes selected, the coordinates in effect for the current video frame appear as crosshairs superimposed over the video image. The crosshairs appear in the display color set for the coordinate marker. The range for coordinates is always (0,0) to (1023,767) with (0,0) being in the lower-left corner, regardless of the video resolution. Before plotting the crosshairs,

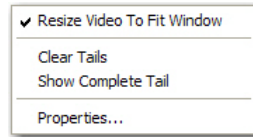
CinePlex Editor scales the marker coordinates to the video resolution. Also, the coordinates that appear in the Video window are always those that are relevant for the frame in the display—not necessarily the selected marker occurrences. That is, if different coordinate marker occurrences are selected in the Marker Occurrences window, in general it does not change the coordinate crosshairs shown in the Video window. Note that if coordinates have not been computed or supplied for a frame, the values for the prior frame are used.

- **Grid Lines** - You have the option of showing grid lines overlaid on the video and also determining the spacing and color of the grid lines.
- **Tails** - While the video plays, it is possible to show the crosshairs with a *tail* line that shows the coordinate positions of previous frames. The length and width of this tail may be configured. By default, the tail changes color according to the age of the points. The tail color results from a blending of the marker color with another specified color; the blending amount increases for older points. If a **Fade-to Color** similar to the background color of the video is chosen, a *fading* effect is created that makes the tail appear to fade away. If the current time frame is rapidly advanced by using either the find functions or the Activity window scroll bar, CinePlex Editor can produce a confusing display for the rendered tails. In this case, from the right-click menu, select **Clear Tails** to erase the tail. Also, you may draw a complete version of the tail by selecting **Show Complete Tail** from the right-click menu. The **Show Complete Tail** feature is useful, for example, for determining the locations visited by the tracked animal. If the mouse pointer is moved outside of the Video window, the complete tail is erased. This menu item shows a line connecting the coordinates for all marker occurrences for the Coordinates marker, as shown in the following image:

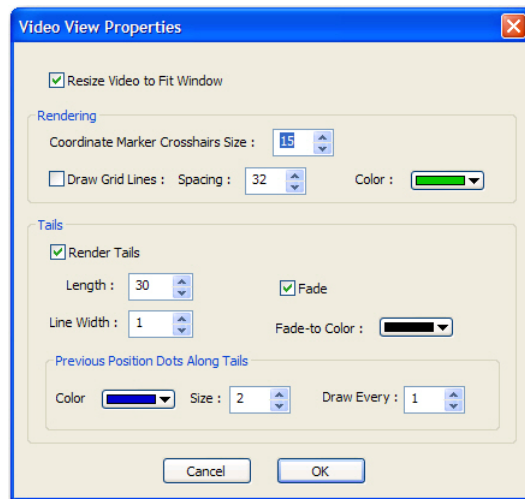


A.2.1.3 Video Right-click Menu

The right-click menu allows changing of the behavior of the window, which includes controlling the tail rendering and stretching the video. Click the right mouse button to open the right-click menu for the Video window:



- **Resize Video To Fit Window** - When checked, this item resizes the video to fit the **Video** window. When unchecked, the video appears at its native resolution regardless of the size of the **Video** window.
- **Clear Tails** - Clicking this item clears the tails from the video window if the **Render Tails** checkbox has been set on the **Video View Properties** dialog box.
- **Show Complete Tail** - Clicking this item shows the complete tail from the whole video file if the **Render Tails** checkbox has been set on the **Video View Properties** dialog box.
- **Properties** - Clicking this item opens the **Video View Properties** dialog box. The properties are discussed below.



- **Resize Video to Fit Window** - This item stretches or shrinks the video to fit the size of the Video window. If not checked, the video is shown at its native resolution of 640x480 pixels.
- **Rendering** - This area contains items that controls how the video is presented in the Video window:

- **Coordinate Marker Crosshairs Size** – This item controls the size of the crosshairs drawn at the current Coordinates marker position.
- **Draw Grid Lines** – This item draws a grid of lines over the Video window.
- **Spacing** – This item controls the spacing of the grid lines, which appear in Coordinates marker units of (0,0) to (1023,767).
- **Color** – This item controls the color of the grid lines. Select a color from the drop-down list.
- **Tails** - This area contains items that control the appearance of the tracking tell tails:
 - **Render Tails** – This item toggles on or off the rendering of the tails that show previous Coordinates marker positions.
 - **Length** – This item controls the length of the tails, which is measured by the number of previous positions that appear in the window.
 - **Line Width** – This item controls the width of the line used to draw tails, which is measured in marker occurrences.
 - **Fade** – This item controls whether or not the tail fades away.
 - **Fade-to Color** – This item controls the color to which the tails fade. Fading occurs as follows:

The color drawn at point p in the tail, where $p = 0$ for the current position and $p = L$ (**Length**) for the oldest position is:

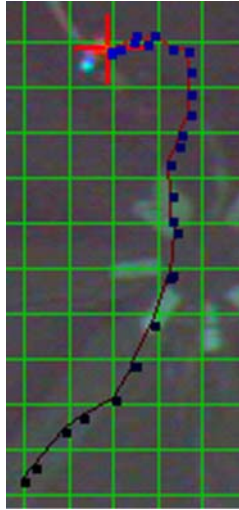
the rendered color at $p = (p/L) \times FC + (1-(p/L)) \times DC$

where

DC = display color for the current Coordinates marker

FC = **Fade-to Color**

- **Previous Position Dots Along Tails** – This area contains the items that control the rendering of the small dots that indicate the previous positions:
 - **Color** – This item controls the color of the small dots at the coordinates of previous marker occurrences.
 - **Size** – This item controls the size in marker occurrences of the small dots at the coordinates of previous Coordinates marker occurrences.
 - **Draw Every** – This item controls a factor that only draws a dot at every N th previous position.
 - The image below shows a segment of the Video window with larger previous-position dots and **Draw Grid Lines** enabled.



A.2.2 Activity Window

In many ways, the Activity window is the heart of CinePlex Editor. The default docking position is at the bottom of the main window. This truncated view shows each important item or area in the Activity window.



A.2.2.1 Function

The Activity window displays markers and marker occurrences against their associated timelines.

A.2.2.2 Features

This section describes the various elements in the Activity window as shown in the illustration above.

- **Channel Zoom Controls** - The vertical zoom buttons appear at the left side under the top banner of the **Activity** window, as the image below shows. Click + to vertically *zoom in* on the display so that fewer time-lines appear, but each time-line is taller. This is the equivalent of selecting **Zoom In to Show Fewer Time-lines** from the right-click menu. Click – to *zoom out*, which is the equivalent of selecting **Zoom Out to show More Time-lines** from the right-click menu. You can also vertically scroll the time-lines in any of the following ways:
 - If the mouse has a wheel, by rotating it. This works when the mouse pointer is positioned anywhere inside the Activity window.
 - By pressing the PAGE UP or PAGE DOWN keys
 - By dragging in the vertical direction in the label area



- **Marker and Unit Labels** - A label for each time-line appears on the left side of the **Activity** window. You can resize the label area by dragging the dividing line between it and the rest of the window. By default, CinePlex Editor selects the **Automatically Adjust Label Area Width** item in the right-click menu, which means that the dividing line continually adjusts so that the labels fit into the label area. To keep the size of the label area constant, click to clear the **Automatically Adjust Label Area Width** item in the right-click menu; this means the beginning of larger marker names can get truncated. If the divider line is dragged, CinePlex Editor automatically clears the **Automatically Adjust Label Area Width** item.
- **Time Range Zoom Controls** - The bottom of the Activity window contains the **Zoom Out** button, the **Zoom In** button, and the scrollbar for expanding, contracting, and moving the time range displayed by the Activity window. Each end contains boxes showing the current minimum and maximum extents of the displayed time range in seconds.
- **Time Range Scroll Bar** - Use the scroll bar at the bottom of the display to move the time span of the display. When the scroll bar is moved, the video frame that appears in the Video window is always updated to remain synchronized with the Activity window.
- **Times of Unit Firings, Marker Times** - The central area of the **Activity** window shows the times of marker occurrences and unit firings as colored

tick marks that are arranged along horizontal **time-lines**. By default, CinePlex Editor provides a horizontal time-line on the display for each marker or spike channel whose **Show** column is checked in the Markers window or the Channels window. The color of the marker ticks results from the display-color setting in the Markers window. The colors of the tick marks on the time-lines for spike channels correspond to the unit classification of each spike. You can set the colors to associate with each unit; to do so, from the **Tools** menu, select **Options** and click the **Colors** tab. Also, if their respective **Show** column in Channels window is checked, CinePlex Editor provides line traces on the display for continuous data channels. To improve clarity, the **Activity** window devotes twice as much vertical space to the continuous data channels than it does to the marker or spike channels. You can drag the dividing line that separates the central area from the top banner. You can also drag a selected marker occurrence to a different time. To drag a marker occurrence to a new time, hold down the **SHIFT** key, click the marker occurrence, and drag it to a new time. For Interval-type markers, the start and end times may be independently adjusted. For more information on the Activity window, see [Section 3.8, “Selecting and Editing Marker Occurrences” on page 39](#). When CinePlex Editor is appropriately configured, click the mouse in the Activity window to perform the following actions:

- Select the marker occurrence for the currently selected marker nearest in time (default). Double click to select a new current marker.
- Add a new marker occurrence
- Change the timestamp of an existing marker occurrence
- **Current File Position** - The top banner contains the *now* triangle, which denotes and displays the current time (or current file position). The current time indicator (*now* triangle) is the white triangle in the following image. The current time (**t**) in seconds appears to the left of the triangle, and the current video frame (**F**) number appears to the right of it. By default, CinePlex Editor positions the triangle in the center of the Activity window, but it can be dragged to a new location in the top banner. This causes the Activity window to display an asymmetric range for the activity surrounding the triangle. For example, from 1 second before to 3 seconds after the triangle position. You can control the time range shown. The range surrounds the current time, which is denoted by the small triangle at the top of the display. The text next to the triangle shows the current time (in seconds) and the current frame number. You can click and drag the current time triangle to a different position within the window of time shown.

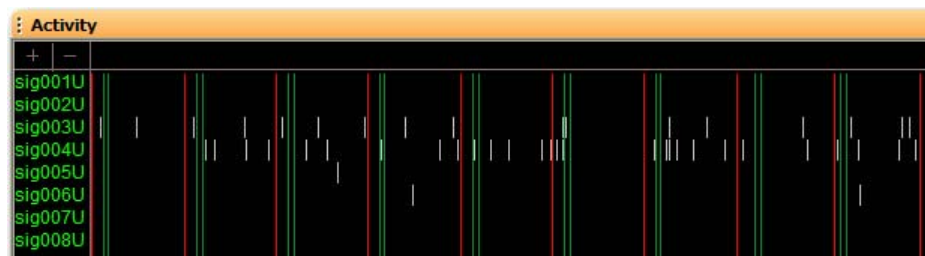


A.2.2.3 Activity Right-click Menu

The **Activity** window has many options that can be controlled by using the right-click menu.



- **Automatically Adjust Label Area Width** - This item causes the dividing line between the labels on the left and the central portion of the view to automatically adjust to accommodate the longest marker name.
- **Show Unsorted Spikes** - Selected by default, this item shows tick marks for unsorted spikes in the color chosen to represent unsorted spikes, or else the spikes do not appear.
- **Hide Invalidated Spikes** - Selected by default, this item hides tick marks for invalidated spikes; clearing this item causes tick marks to appear in a dark grey color.
- **Show All Units for a Channel on One Time-line** - Selected by default, this item plots each spike channel with a single time-line, and plots spikes with different units from that channel on the same time-line, but with different colors according to their unit classification. Clearing this item causes each unit to appear on a separate time-line. The channel name plus a letter of the alphabet denoting the unit appear as a label for the per-unit timelines. That is, if the channel *sig001* has two defined units and some unsorted spikes and if **Show Unsorted Spikes** is checked, there are 3 time-lines for that channel, which appear as *sig001U* (unsorted), *sig001a*, and *sig001b*.
- **Show Markers Across All Time-lines** - Normally, each marker appears as its own time-line in the display. Select this item to make each marker appear as a vertical line drawn across all of the other channels. This arrangement makes it somewhat easier to tell when marker occurrences happened with respect to spikes. The following image shows the **Activity** window with the **Show All Units for a Channel on One Time-line** item cleared and the **Show Markers Across All Time-lines** item selected:



- **Show Markers On Top Time-lines** - Selected by default, this item shows the time-lines for the markers at the top of the view, before the spike or continuous channel time-lines. Clearing this item causes the marker channels to appear at the bottom. This item is only relevant if the **Show Markers Across All Time-lines** item is cleared.
- **Show Line for Each Time-line** - This item draws a horizontal line in the middle of each time-line.
- **Zoom Out ..., Zoom In to Show Fewer Time-lines** - As previously discussed, this item shows more or fewer time-lines.

A.2.3 Markers Window

The **Markers** window is the central location for information about markers. The image below shows the Markers window.

Markers						
	Name	Type	Count	Key	Show	Display Color
▶	Frame Marker	F	1789	F	<input checked="" type="checkbox"/>	
	Strobed	S	3570	1	<input checked="" type="checkbox"/>	
	Start	T	1	2	<input checked="" type="checkbox"/>	
	Stop	T	1	3	<input checked="" type="checkbox"/>	
	PLX Coord 1	C	1591	4	<input checked="" type="checkbox"/>	

A.2.3.1 Function

The **Markers** window shows a quick overview of the important properties of the markers defined in the current project, and it provides easy access to all marker-related operations.

A.2.3.2 Features

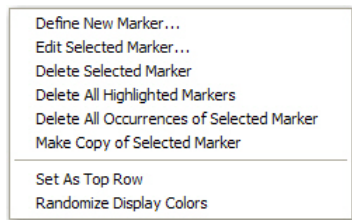
A >> in the leftmost column indicates the currently selected marker. The columns in the Markers window show the following information about each marker:

- **Name** – Shows the name given to each marker.
- **Type** – Indicates the marker type, as listed in [Section 3.2, “Marker Types” on page 22](#).
- **Count** – Shows the number of occurrences of this marker.
- **Key** – Indicates the keyboard key associated with the marker.

- **Show** – When selected, this item displays the occurrences of this marker in the **Activity** window, and also in the Video or Scalar windows as appropriate for the marker type.
- **Display Color** – Shows the color used to display occurrences of this marker in the Activity, Video, or Scalar windows. Click a marker in the **Display Color** column to open a color selection dialog box, which allows changing the display color for a marker.

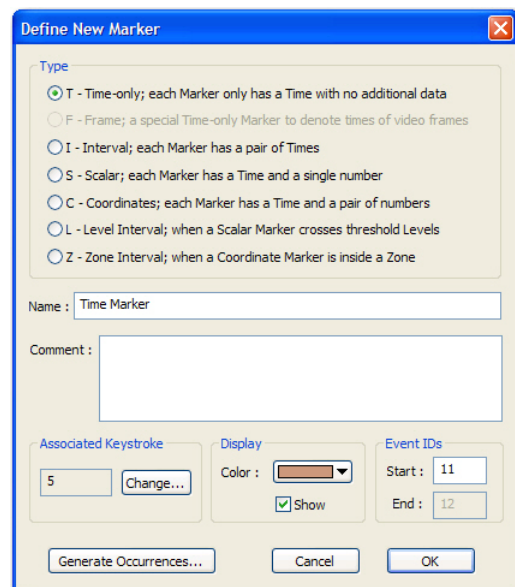
A.2.3.3 Markers Right-click Menu

Right-clicking the mouse in the Markers window opens a right-click menu.



- **Define New Marker**

This item opens the **Define New Marker** dialog box.



- **Type** - In the **Type** area, select a marker type for the new marker. For a description of all marker types, see [Section 3.2, “Marker Types” on page 22](#). Under most circumstances, a new Frame marker cannot be created.
- **Name** - Enter a unique name for the new marker. Marker names must be unique.

- **Comment** - This is an optional box in which a free-form comment that describes the new marker may be typed.
- **Associated Keystroke** - This area identifies the keystroke that is associated with this marker, which can be used for finding or inserting new marker occurrences. CinePlex Editor suggests an unused key; click **Change** to open the **Assign Key** dialog box and select a different key. When the dialog box appears, press the key to associate and click **OK**.

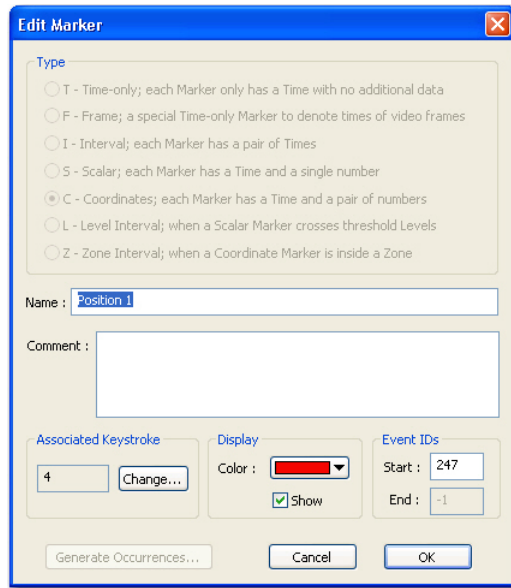
Note: Only single-keystrokes (not CTRL- or ALT- key combinations) can be associated with Markers.

- **Display** - This area identifies the display color and the show setting for the marker.
 - **Color** – This box shows the display color for this marker in various windows. You can also set the color directly in the Marker window.
 - **Show** – This item toggles the appearance of the Marker in various windows. You can also set this item directly in the Marker window.
- **Event IDs** - This area shows the **Event IDs** associated with the marker. Use these IDs only when this marker is exported to a PLX file. These event IDs are the Plexon external event IDs that represent this marker in the PLX file. For interval-type markers, a second event ID must be specified to represent the end time for the interval.

Note: These IDs must be unique across all markers. CinePlex Editor suggests an unused and unique value for these IDs, so they do not usually require immediate attention when the marker is first created. If the data is exported to a PLX file, there will be an opportunity to change these event IDs.

Note: You can also click **Generate Occurrences** to have CinePlex Editor create the marker and also automatically populate the new marker with algorithmically-generated marker occurrences. The available methods for automatically populating the marker with marker occurrences varies by marker type; for a description, see [Section 3.6, “Automatically Generating Marker Occurrences” on page 31](#).

- **OK** - Click **OK** to close the dialog box and create the new marker.
- **Edit Selected Marker** - This item opens the **Edit Marker** dialog box.



Note: You can also open the **Edit Marker** dialog box from the right-click menus in the Markers and Marker Occurrences windows.

The marker type cannot be changed for an existing marker. However, it is possible to change the following marker items:

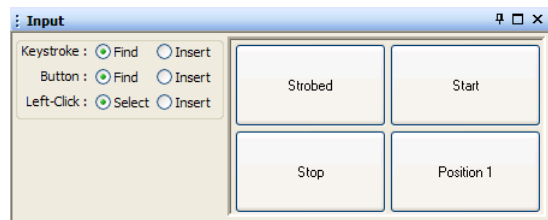
- **Name** - Enter a unique marker name. Marker names *must* be unique. Duplicates are not accepted during the **Add Marker** process.
- **Comment** - Add, add to, or edit a free-form comment that describes the marker.
- **Associated Keystroke** - This area identifies the keystroke that is associated with this marker; click **Change** to open the **Assign Key** dialog box and select a different key. When the **Assign Key** dialog box appears, press the key to associate and click **OK**.

Note: Only single-keystrokes can be associated with markers. CTRL- or ALT- key combinations are not valid.

- **Display** - This area identifies the display color and the show setting for the marker.
 - **Color** – This box shows the display color of this marker in various windows. Select a new color from the drop-down list.
 - **Show** – This item toggles the appearance of the marker in various windows. Change as needed.
- **Event IDs** - This area shows the **Event IDs** associated with the marker. These event IDs are used when this marker is exported to a PLX file; for more information, see **Event IDs** on [page A-38](#). Change the event IDs as needed.

- **Delete Selected Marker** - This item deletes the selected marker and all of its occurrences.
- **Delete All Highlighted Markers** - This item deletes all selected markers and all of their occurrences.
- **Delete All Occurrences of Selected Marker** - This item deletes all of the occurrences of the selected marker, but does not delete the selected marker.
- **Make Copy of Selected Marker** - This item copies the selected marker to the clipboard.
- **Set As Top Row** - Sets the highlighted items in the **Show** or **Display Color** columns to the same value or color as the topmost value.
- **Randomize Display Colors** - Sets random colors for all of the **Display Color** items.

A.2.4 Input Window



A.2.4.1 Function

The Input window consists of an area of option buttons (left side of window) and an array of marker buttons (right side of window). The option buttons control the operation occurring with keystrokes, the marker buttons, or the left mouse button.

A.2.4.2 Features

The **Input** window includes selections for the following three actions:

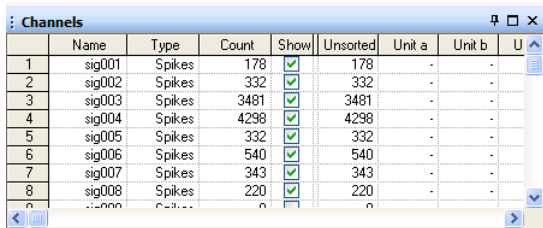
- **Keystroke** – You can bind a keystroke to the current marker, which can be used to **Find** the next occurrence of the marker or **Insert** a new occurrence of the marker.

Note: If CinePlex Editor is in looping mode (see [Section 2.9, “Understanding Looping” on page 18](#)), the search for the next marker occurrence wraps around the end of the file and continues the search at the beginning.

- **Button** – Specific marker buttons appear in the array on the right side of the **Input** window. Click a marker button to **Find** the next occurrence of the marker or **Insert** a new occurrence of the marker.
- **Left-Click** – This item refers to a click of the left mouse button in the **Activity** window. **Select** finds the nearest occurrence of the selected marker. **Insert** inserts a new occurrence of the selected marker at the time

corresponding to the mouse pointer position when the left mouse button is clicked.

A.2.5 Channels Window



	Name	Type	Count	Show	Unsorted	Unit a	Unit b	U
1	sig001	Spikes	178	<input checked="" type="checkbox"/>	178	-	-	
2	sig002	Spikes	332	<input checked="" type="checkbox"/>	332	-	-	
3	sig003	Spikes	3481	<input checked="" type="checkbox"/>	3481	-	-	
4	sig004	Spikes	4298	<input checked="" type="checkbox"/>	4298	-	-	
5	sig005	Spikes	332	<input checked="" type="checkbox"/>	332	-	-	
6	sig006	Spikes	540	<input checked="" type="checkbox"/>	540	-	-	
7	sig007	Spikes	343	<input checked="" type="checkbox"/>	343	-	-	
8	sig008	Spikes	220	<input checked="" type="checkbox"/>	220	-	-	

A.2.5.1 Function

The Channels window displays all of the channels in the neural data file and their associated properties.

A.2.5.2 Features

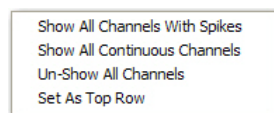
The columns in the Channels window list the following information for each channel:

- **Name** – Shows the name of the channel
- **Type** – Indicates the type of channel, either spike or continuous
- **Count** – Shows the number of spikes for spike channels, or the number of samples for continuous channels
- **Show** – When selected, shows the spikes or continuous data from that channel in the Activity window
- **Unsorted, Unit a, b, c, ...** – Indicates the number of spikes in the channels that are unsorted, or that belong to Unit a, Unit b, etc.

Note: By default, if the **Show** checkbox is clear, any continuous data channels in the neural data file do not appear in the Activity window.

A.2.5.3 Channels Right-click Menu

Clicking the right mouse button will open a right-click menu with the following items:



- **Show All Channels With Spikes** - Clicking this item resets the window to show all channels with spikes.
- **Un-Show All Channels** - Clicking this item resets the window to hide all channels.

- **Show Only Selected Channel** - Clicking this item resets the window to only show the selected channel.
- **Set As Top Row** - Clicking this item sets selected columns to the same value as the same columns in the top row.

A.2.6 File Info Window

The File Info window does not appear by default. To open the File Info window, from the **View** menu, select **File Info View**.

The screenshot shows a window titled "File Summary" with a yellow header bar. The window contains a table with three main sections: "CinePlex Project File:", "Video Data File:", and "Neural Data File:". Each section lists various file properties and their values.

CinePlex Project File:	
File Name:	C:\Program Files\Plexoi
Comment:	

Video Data File:	
File Name:	C:\Program Files\Plexoi
Time & Date (from file):	Thursday, March 03, 2
Video Size:	640 by 480
Frame Rate:	30.000299
Number of Frames:	1789
Has Timestamps:	Yes

Neural Data File:	
File Name:	C:\Program Files\Plexoi
Time & Date (from header):	Thursday, March 03, 2
Comment:	
File Size (bytes):	1718000
Experiment Length (sec):	59.575
Format Version:	105
Channels:	32
Data Type:	Single
Timestamp Frequency (Hz):	40000.000
A/D Frequency (Hz):	40000.000
Total Number of Waveforms:	9724
Cont. Channels:	4
Peak Voltage (mV):	5000
A/D Resolution (bits):	12
Total Number of Units:	0
Number of Channels with Units:	0
Avg Units per Active Chan:	-

A.2.6.1 Function

The File Info window shows various items of information about the neural data files and video files that are currently loaded into CinePlex Editor.

A.2.6.2 Features

The File Info window contains the following items:

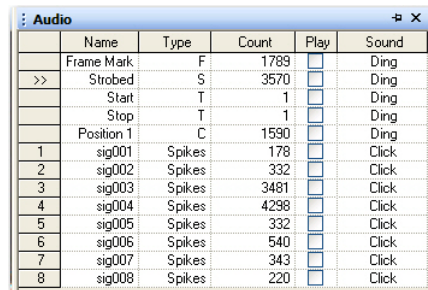
- **CinePlex Project File** - This area contains information about the currently opened CinePlex project file.
 - **File Name:** - This item contains the name of the project file.
 - **Comment:** - This editable item contains comments about the project file.

- **Video Data File** - This area contains information about the currently opened video data file.
 - **File Name:** - This item contains the name of the video data file.
 - **Time & Date (from file):** - This item contains the time and date that the video data file was last modified.
 - **Video Size:** - This item contains the resolution of the video data file. Default is 640 X 480.
 - **Frame Rate:** - This item contains the frame rate of the video data file. Default is 30 frames per second.
 - **Number of Frames:** - This item contains the total number of frames in the video data file.
 - **Has Timestamps:** - This item indicates if the frames are timestamped or not.
- **Neural Data File** - This area contains information about the currently opened neural data file.
 - **File Name:** - This item contains the name of the neural data file.
 - **Time & Date (from header):** - This item contains the time and date that the neural data file was last modified.
 - **Comment:** - This item contains comments about the neural data file. This field is not editable in the File Info window.
 - **File Size (bytes):** - This item contains the size of the neural data file in bytes.
 - **Experiment Length (sec):** - This item contains the duration of the experiment in seconds.
 - **Format Version:** - this item contains the format version of the file.
 - **Channels:** - This item contains the total number of channels.
 - **Data Type:** - This item contains the data type. Values are **Single** or **Trodal**.
 - **Timestamp Frequency (Hz):** - This item contains the frequency at which the timestamps are created. Default is 40,000 Hz.
 - **A/D Frequency (Hz):** - This item contains the analog-to-digital frequency. Default is 40,000 Hz.
 - **Total Number of Waveforms:** - This item contains the total number of waveforms in the neural data file.
 - **Cont. Channels:** - This item contains the number of continuous channels.

- **Peak Voltage (mV):** - This item contains the peak voltage of the signals in millivolts.
- **A/D Resolution (bits):** - This item contains the analog-to-digital resolution in bits. Default is 12.
- **Total Number of Units:** - This item contains the total number of occurrences for all channels.
- **Number of Channels with Units:** - This item contains the number of channels that have units.
- **Avg Units per Active Chan:** - This item contains the ratio of **Total Number of Units** to **Number of Channels with Units**.

A.2.7 Audio Output Window

The Audio Output window is hidden by default. To open the Audio Output window, hover the mouse over the Audio tab of the sidebar tabs at the right side of the screen, select **Audio Output** from the **View** menu, or click the **Audio Output View** button on the toolbar. The image below shows the Audio Output window.



	Name	Type	Count	Play	Sound
	Frame Mark	F	1789	<input type="checkbox"/>	Ding
>>	Strobed	S	3570	<input type="checkbox"/>	Ding
	Start	T	1	<input type="checkbox"/>	Ding
	Stop	T	1	<input type="checkbox"/>	Ding
	Position 1	C	1590	<input type="checkbox"/>	Ding
1	sig001	Spikes	178	<input type="checkbox"/>	Click
2	sig002	Spikes	332	<input type="checkbox"/>	Click
3	sig003	Spikes	3481	<input type="checkbox"/>	Click
4	sig004	Spikes	4298	<input type="checkbox"/>	Click
5	sig005	Spikes	332	<input type="checkbox"/>	Click
6	sig006	Spikes	540	<input type="checkbox"/>	Click
7	sig007	Spikes	343	<input type="checkbox"/>	Click
8	sig008	Spikes	220	<input type="checkbox"/>	Click

A.2.7.1 Function

The Audio Output window controls CinePlex Editor's ability to play a sound through the computer's audio system when Markers or neural spikes occur during data playback.

A.2.7.2 Features

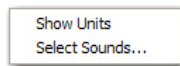
The columns of the Audio Output window include:

- **Name** - This column contains the name of each marker.
- **Type** - This column contains the type of each marker.
- **Count** - This column contains the number of occurrences of each marker.
- **Play** - This column contains a checkbox that controls whether any sound will be played when the Markers or neural spikes of that type pass by the 'current time' marker during animated playback.

- **Sound** - This column contains a droplist that lists all the available sounds that CinePlex Editor can play. If the Play checkbox is checked, the sound selected in the Droplist will play when an occurrence of the corresponding Marker or neural spike is encountered during playback. The contents of this list can be controlled from the **Audio** tab of the **Tools | Options...** dialog, see [“Options” on page A-57](#).

A.2.7.3 Audio Output Right-click Menu

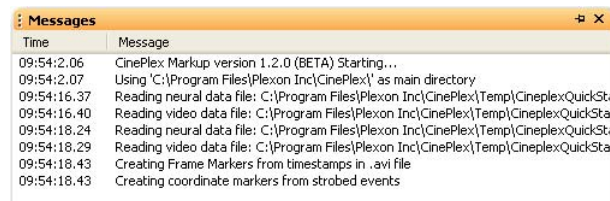
The Audio Output Window has a right-click context menu that contains the following menu entries:



- **Show Units** - The Audio Output view can show just one line per neural spike channel (the default). In this mode, CinePlex Editor will play the same selected sound when any spike occurs on that channel, regardless of the unit designation of that spike. When Show Units is checked, each unit on each channel gets a separate line, as shown in the above screenshot. In this mode, every unit can have a different sound mapped to it and can be independently enabled or disabled for playing. This selection is equivalent to checking or unchecking the ‘Show Units in the Audio Output Window’ checkbox on the **Tools | Options | Audio** tab.
- **Select Sounds** - Clicking this item will show the Audio tab on the **Tools | Options** dialog box, which allows loading new sounds from WAV files so that they are available for mapping to Markers or Units.

A.2.8 Messages Window

To open the **Messages** window (hidden by default), hover the mouse over the **Messages** tab of the sidebar tabs at the right side of the screen, select **Messages** from the **View** menu, or click the **Messages View** button on the toolbar.



A.2.8.1 Function

The Messages window displays timestamps and application events and is used for troubleshooting purposes by Plexon Support.

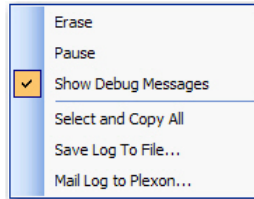
A.2.8.2 Features

- **Time** - This column contains timestamps of the events.

- **Message** - This column contains descriptions of the events.

A.2.8.3 Messages Right-click Menu

Right-clicking the mouse in the Messages window displays the right-click menu.



- **Erase** - Clicking this item erases all messages from the Messages window.
- **Pause** - If this item is checked, message logging is paused.
- **Show Debug Messages** - If this item is checked, then debug messages will appear in the Messages window. This can be useful for troubleshooting.
- **Select and Copy All** - Clicking this item selects all the messages and copies them to the clipboard.
- **Save Log to File** - Clicking this item displays a standard file save dialog box and allows the message log to be saved to a file.
- **Mail Log to Plexon** - Clicking this item will sent the messages log to Plexon for troubleshooting. Note that a mail client and associated account information must be present on the computer for E-mail to work.

A.2.9 Marker Occurrences Window

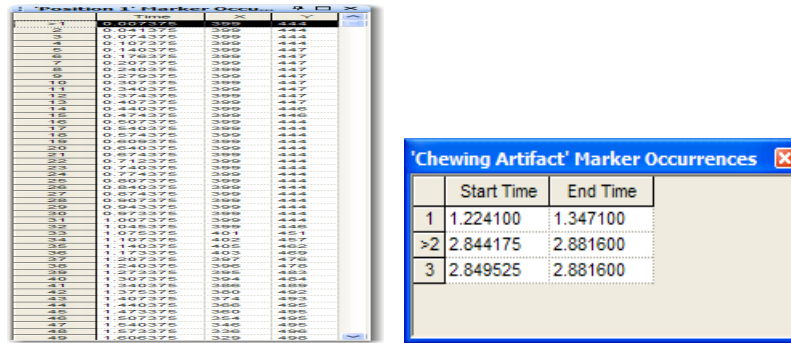
The Marker Occurrences window includes an entry for each occurrence of the currently-selected marker. The currently-selected marker occurrence appears with a > in the first column. Click any marker to make it the currently-selected marker. More than one Marker Occurrences window may be opened. The window also changes title and columns depending on the marker type of the currently-selected marker.

A.2.9.1 Function

The function of the Marker Occurrences window is to display information about all occurrences of the currently selected marker.

A.2.9.2 Features

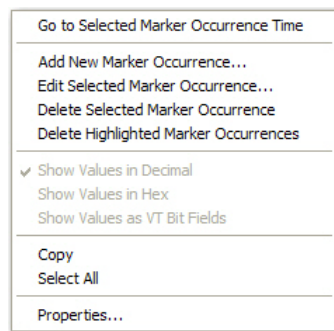
The features of the Marker Occurrences window will vary according to the type of selected marker. A coordinate marker will have the timestamp, an x-coordinate, and a y-coordinate while an interval marker will have the beginning timestamp and the ending timestamp as shown in the images below.



Scrolling the Activity window or animate time causes the Marker Occurrences window to update continually to show the marker occurrences closest to the current time.

A.2.9.3 Marker Occurrences Right-click Menu

Right-clicking the mouse in the Marker Occurrences window opens a right-click menu.



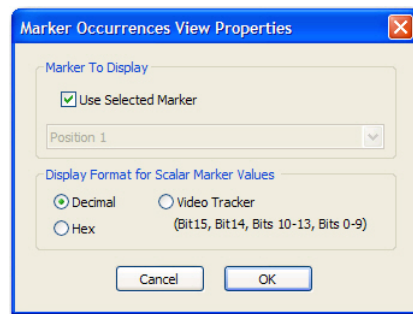
- **Go to Selected Marker Occurrence Time** - Clicking this item makes the time of the currently-selected marker occurrence the current time. This will advance the current frame and reposition the Activity window.
- **Add, Edit, and Delete Marker Occurrence Menu Items** - The items in the section below 'Go to Selected Marker Occurrence Time' except for "Delete Highlighted Marker Occurrences" are the same as the items on the **Edit** menu. For complete information, see ["Edit Menu" on page A-37](#).

There are three different ways to display marker occurrence data:

- **Show Values in Decimal** - Clicking this item displays the marker occurrence data in normal decimal format.
- **Show Values in Hex** - Clicking this item displays the marker occurrence data in hexadecimal format.
- **Show Values as VT Bit Fields** - Clicking this item displays the marker occurrence data as VideoTracker (VT) bit fields. For more information on VT

bit fields, see “[Marker Occurrences and the Marker Occurrences Window](#)” on page A-70.

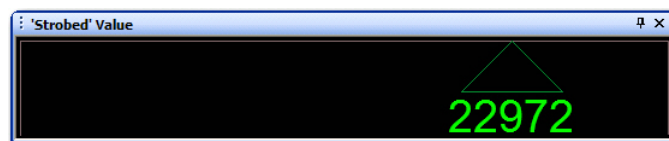
- **Copy and Select All** - These items function as standard Windows® copy and select functions.
- **Properties** - Clicking this item displays the **Marker Occurrences View Properties** dialog box. Clicking this item enables the configuration of marker occurrence windows to show the marker occurrences of a specific marker instead of the currently selected marker. This capability may be used to display marker occurrences simultaneously for different markers on screen.



- **Marker To Display** - This area contains a drop-down list of markers. The currently selected marker appears in the dimmed list box.
- **Display Format for Scalar Marker Values** - This area contains items that control the display format for Scalar markers:
 - **Decimal** – This item displays the Scalar markers in decimal format.
 - **Hex** – This item displays the Scalar markers in hexadecimal format.
 - **VideoTracker** – This item displays the Scalar markers in Plexon VideoTracker format.

A.2.10 Scalar Window

Scalar windows do not appear by default. To open a Scalar window, from the **View** menu, select **New Scalar View**.



A.2.10.1 Function

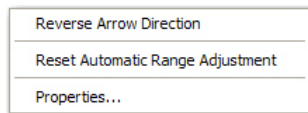
The **Scalar** window provides an at-a-glance graphical representation of a scalar value as a pointer arrow on a scale.

A.2.10.2 Features

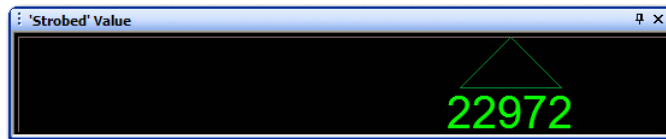
The Scalar window re-oriens itself depending on the size of the view. If the Scalar window is tall and narrow, the pointer points horizontally. If the Scalar window is short and wide, the pointer points vertically. Like the coordinate crosshairs in the Video window, the position of the pointer always reflects the value for the selected marker occurrence. The numerical value also appears next to the pointer. Like the Marker Occurrences window, there can be multiple Scalar windows on the screen at once, with each one showing a different scalar marker.

A.2.10.3 Scalar Right-click Menu

Right-clicking in the Scalar window displays the following menu:

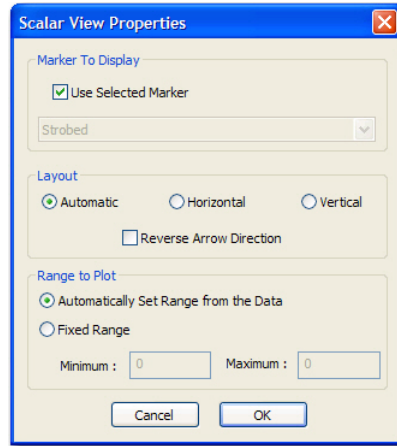


- **Reverse Arrow Direction** - By default, the Scalar window re-oriens itself depending on its size. If the Scalar window is tall and narrow, the arrow is horizontal. If the Scalar window is short and wide, the arrow is vertical. By default, the arrow points either left or up, but the direction may be reversed by selecting **Reverse Arrow Direction** from the right-click menu. The position of the arrow always reflects the value for the selected marker occurrence. As shown in the following image, the numerical value of the selected scalar marker occurrence also appears at the base of the arrow.



Like the Marker Occurrences window, there can be multiple Scalar windows on screen at once, with each one showing a different Scalar marker.

- **Reset Automatic Range Adjustment** - By default, CinePlex Editor automatically adjusts the range of scalar values to accommodate the range of scalar values that appear in the data as new Scalar values become current. You can reset the range by selecting **Reset Automatic Range Adjustment** from the right-click menu, which sets the range to dynamically expand based on the subsequent values that appear. Alternately, a fixed range may be set in the **Scalar View Properties** dialog box.
- **Properties** - Clicking the **Properties** item displays the **Scalar View Properties** dialog box.

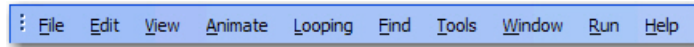


- **Marker To Display** - This area contains the items that control which marker appears in the Scalar window:
 - **Use Selected Marker** – This item displays the current value for a new marker in the Scalar window, if the marker is a Scalar type.
 - **List box** – Clearing **Use Selected Marker** causes the Scalar window to display the values of the Scalar marker that appears in the drop-down list, regardless of which marker is selected.
- **Layout** - The area contains the items that control the appearance of the Scalar window:
 - **Automatic** – This item sets the Scalar window to automatically switch its layout from horizontal to vertical based on the current size of the Scalar window. For example, if the window is taller than it is wide, a vertical layout appears, otherwise a horizontal layout appears.
 - **Horizontal** – This item sets the Scalar window to a horizontal layout, regardless of the dimensions of the Scalar window.
 - **Vertical** – This item sets the Scalar window to a vertical layout, regardless of the dimensions of the Scalar window.
 - **Reverse Arrow Direction** – This item toggles the direction that the indicator arrow points between up/down for horizontal layouts and left/right for vertical layouts.
- **Range to Plot** - This area contains the minimum and maximum values to show on the scale:
 - **Automatically Set Range from the Data** – This item automatically and dynamically adjusts the range as new values are encountered in the Scalar marker occurrences. The current range being plotted always appear dimmed in the **Minimum** and **Maximum** boxes.

- **Fixed Range** – This item allows entering specific values for the range in the **Minimum** and **Maximum** boxes.

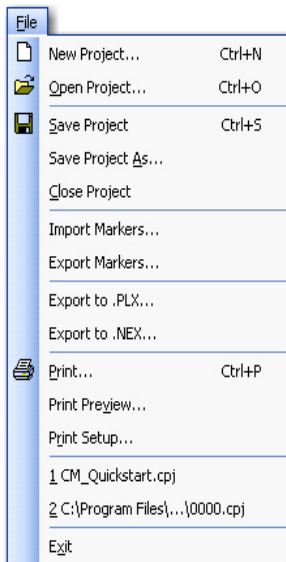
A.3 Menus

Menus provide access to the CinePlex Editor features, commands, controls, and settings. The following sections describe each CinePlex Editor menu in detail. You can also use the toolbar buttons to execute many of the commands that appear on the CinePlex Editor menus.



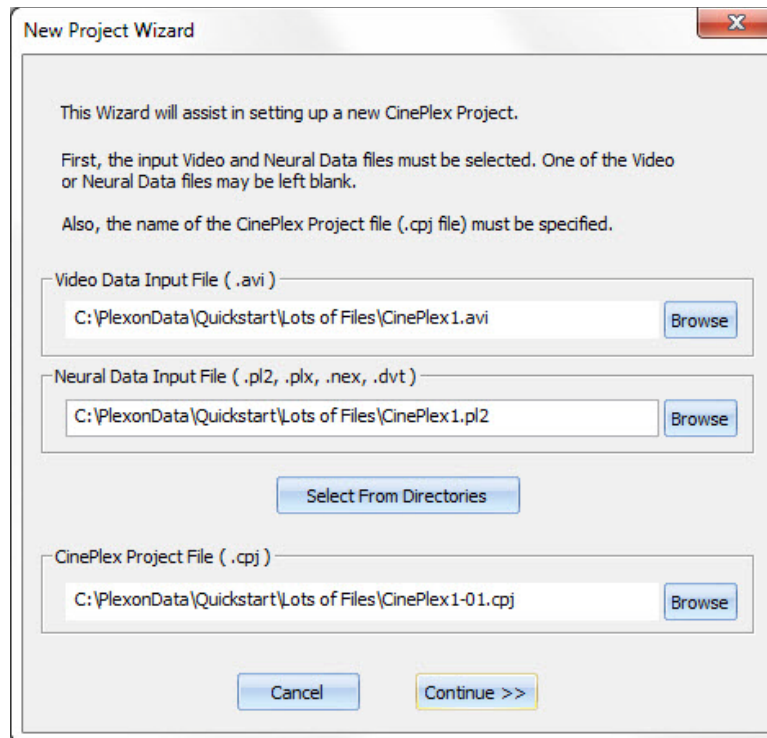
A.3.1 File Menu

The following image shows the **File** menu.



A.3.1.1 New Project

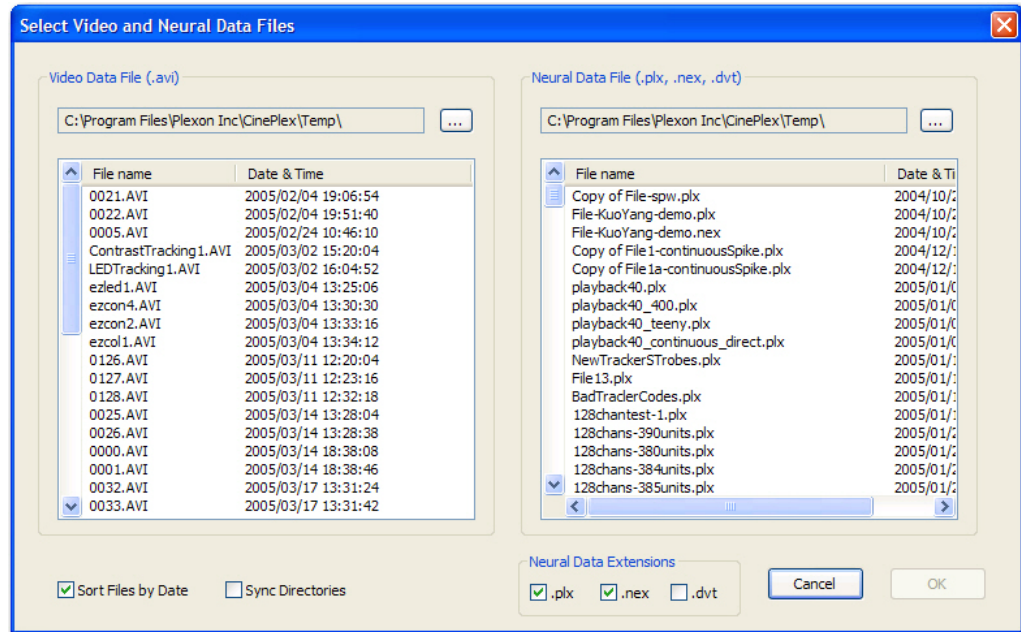
This item opens the **New Project Wizard** dialog box which proceeds through the necessary steps to set up a new project. In the **Welcome To CinePlex** dialog box, click **Start a New CinePlex Project** to open the **New Project Wizard** dialog box. Otherwise, from the **File** menu, click **New Project**.



The first box in the **New Project Wizard** dialog box helps to select filenames.

Note: Specify a video file or a neural data file, or both.

- **Video Data Input File (.avi)** - This box allows you to specify a filename for the video file. The video file must be an Audio Video Interleave (AVI) file.
- **Neural Data Input File (.pl2, .plx, .nex, .dvt)** - This box allows you to specify a file name for the neural data file. The neural data file can be a Plexon PL2 (or PLX) file, a NeuroExplorer[®] NEX file, or a digital video tracker (DVT) file.
- **CinePlex Project File (.cpj)** - This box requires you to specify a filename for the CinePlex Project (CPJ) file.
- **Browse** - This button allows you to open a file selection dialog box. When one filename is selected, CinePlex Editor suggests names for the remaining unspecified filenames, which are based on the selected filename.
- **Select From Directories** - This button opens the **Select Video and Neural Data Files** dialog box, which provides a convenient alternative to **Browse**, where it is possible to display and match pairs of files from two directories. The **Select Video and Neural Data Files** dialog box provides list boxes for two different directories. You can use the various features of this dialog box to create project files.



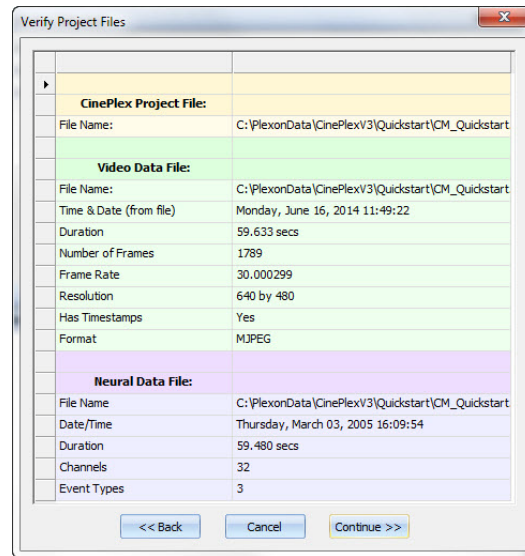
- **Video Data Input File (.avi)** - This area displays AVI files, file system dates, and times. Click the ... button to select a different directory for the video data files.
- **Neural Data Input File (.plx, .nex, .dvt)** - This area displays PLX, NEX, and DVT files, file system dates, and times. Click the ... button to select a different directory for the neural data files.
- **Sort Files by Date** - This checkbox is checked by default and causes the files to be sorted by date. Click to clear this checkbox to sort by file name.
- **Sync Directories** - If this checkbox is checked, it forces the two directories to be identical, which can save the effort of having to reselect the same directory again if the video and neural data files happen to reside in the same directory.
- **Neural Data Extensions** - These checkboxes allow you to select the extensions for the neural data files to appear in the list box.

Whenever a file is selected from one of the list boxes, the dialog box attempts to select the file from the other list box that best matches the file selected. This feature is very convenient for matching up the files collected using CinePlex Studio with their corresponding PLX files, because the file dates and times should be nearly the same.

When the correct files have been highlighted in the two directory listings, click **OK** to enter the selected files into the appropriate text boxes in the **New Project Wizard** dialog box. After entering the correct filenames, click **Continue >>** to open the **Verify Project Files** dialog box.

A CinePlex Editor User Interface

The **Verify Project Files** dialog box provides complete information on the files being entered into the project. It lists relevant information for each file type.



- **CinePlex Project File** - This box lists the project file location and name.
- **Video Data File** - This box lists the video file location and name.
- **Time & Date (from file)** - This box shows the date and time (hh:mm:ss) when the video file was saved.
- **Duration** - This box indicates the duration of the video file in seconds.
- **Number of Frames** - This box lists the total number of frames in the video file.
- **Frame Rate** - This box indicates the frame rate at which the video was recorded.
- **Resolution** - This box shows the resolution of the video in pixels.
- **Has Timestamps** - This box indicates **Yes** if timestamps are contained in the video file and **No** if otherwise.
- **Format** - This box shows the video compression format of the file.
- **Neural Data File** - This box lists the neural file location and name.
- **Date/Time** - This box shows the date and time (hh:mm:ss) when the neural file was saved.
- **Duration** - This box indicates the duration of the neural file in seconds.
- **Channels** - This box lists the number of data channels in the neural file.
- **Event Types** - This box lists the number of different event types contained in the neural file.

After verifying that the correct files have been selected, click **Continue >>** to exit the Wizard. CinePlex Editor creates the initial project file.

Note: To have the directories containing the files selected appear as the defaults the next time CinePlex Editor starts, from the **Tools** menu, choose **Options**, click the **General** tab, and select **Use the last directory of the previous session as Initial Directory**.

Note: Keep the related project (CPJ), neural data (PLX) and video (AVI/DVT) files together in the same folder. Then, after you open the CPJ file, the system will automatically find the appropriate PLX and AVI/DVT files.

A.3.1.2 Open Project

This item opens a standard Windows **Open** dialog box to allow choosing an existing project file (CPJ) to open.

A.3.1.3 Save Project, Save Project As, and Close Project

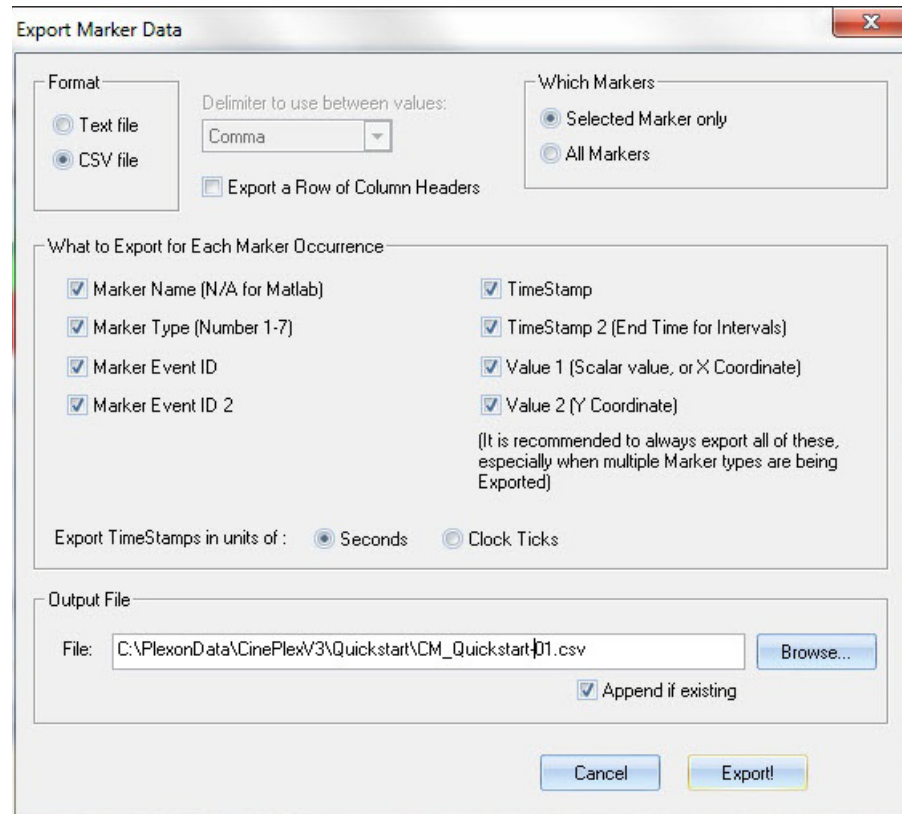
These items apply to a CPJ file and its related video file and neural data file. These commands use standard Windows dialog boxes.

A.3.1.4 Import Markers

This item opens a standard Windows **Open** file-selection dialog box. When a file is selected, CinePlex Editor imports the file to create new markers in the project; for more information, see [Section 3.10, “Importing Markers” on page 41](#).

A.3.1.5 Export Markers

This item opens the **Export Marker Data** dialog box. The **Export Marker Data** dialog box includes all the items to set prior to exporting the file. The following image shows the default view of the dialog box.



- **Format** - This area provides a choice of two file types: Text file or comma-separated-values (CSV) file.
 - **Delimiter to use between values** - This dropdown allows you to select one of the following delimiters to use between the columns of text (if **Text File** is selected for the format):
 - Comma
 - Comma, space
 - Space
 - Semicolon
 - Tab
 - **Export a Row of Column Headers** - This checkbox allows exporting the first row as a row of textual labels for each column, which can be helpful when you are reading the exported data file.
- Note:** CinePlex Editor exports marker occurrences for all formats as one occurrence per row, and all rows have the same number of entries. The number of entries in each row depend on the selections made in the **What to Export for Each Marker Occurrence** area.
- **Which Markers** - The default value is **Selected Marker only**. Selecting All Markers causes the occurrences for all markers to be exported.

- **What to Export for Each Marker Occurrence** - The selections in this area determine which columns appear for each marker occurrence (row). The available columns always appear in a fixed order; clearing a checkbox removes the column. The available items for export are:

- **Marker Name** – This item includes the textual name of the marker in the exported file. The marker name is generally useful only when selecting **All Markers** to export, otherwise the marker name is the same for all marker occurrences when selecting **Selected Marker only** to export.
- **Marker Type (Number 1-7)** – This item exports a number that indicates the type of the marker, as indicated in the following table:

1	Time-only
2	Frame
3	Interval
4	Scalar
5	Coordinates
6	Level Interval
7	Zone Interval

Note: For a complete explanation of the marker types, see [Section A.6, “Marker Occurrences and the Marker Occurrences Window” on page 70](#).

- **Marker Event ID** – This item exports the Event ID associated with this marker; for more information, see **Event IDs** on [page A-38](#).
- **Marker Event ID 2** - This item exports the second Event ID associated with this marker. This item applies only if the marker is an Interval, Level Interval, or Zone Interval type.
- **TimeStamp** - This item exports the time of the marker occurrence. For Interval-type events, this is the start time.

Note: You can export timestamps in units of seconds or in raw clock ticks; see **“Export TimeStamps in units of”**, which follows in this list.

- **TimeStamp2 (End Time for Intervals)** - This item is only relevant for Interval-type marker occurrences and it exports the end time.
- **Value 1 (Scalar value, or X Coordinate)** - This item exports different things, which depend on the marker type. For Scalar markers, it exports the scalar value. For Coordinate markers, it exports the X coordinate value. For all other markers, it exports -1.

- **Value 2 (Y Coordinate)** - This item exports different things, which depend on the marker type. For Coordinate markers, it exports the T coordinate value. For all other markers, it exports -1.
- **Export TimeStamps in units of** – You can export time stamps in one of the following units:
 - **Seconds** – This item exports the values for **TimeStamp** and **TimeStamp 2** in seconds.
 - **Clock Ticks** – This item exports the values for **TimeStamp** and **TimeStamp 2** in raw ticks of the system clock.
- **Output File** - Type or select the output file name in the **File** box. Under **Format**, click the **Append if existing** checkbox to append the marker data onto the end of a file that already exists on disk. Otherwise, the existing file is overwritten.



CAUTION

Set the Append if existing checkbox correctly

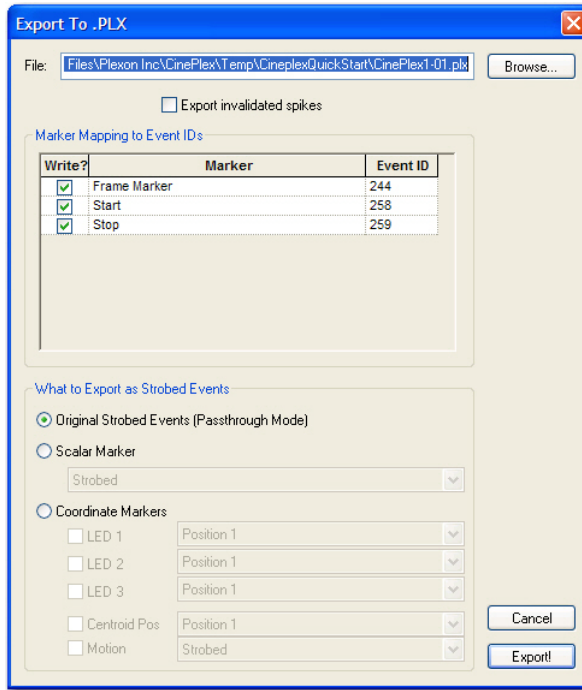
Pay special attention to the **Append if existing** checkbox.

If it is *checked*, the new marker data will be appended to the existing file.

If it is *unchecked*, the new export file will overwrite the current export file.

A.3.1.6 Export to PLX

This item opens the **Export To PLX** dialog box.



- **File** - Type an export file name and path, or click **Browse** and select an existing file.
- **Export invalidated spikes** - Click this checkbox to export invalidated spikes to the PLX file. Invalidated spikes appear with a unit number of 0 (unsorted).
- **Marker Mapping to Event IDs** - This list box controls which markers appear in the output file and which event IDs represent them. Only Time-only, Frame, and Interval-type markers appear in this list box; Scalar and Coordinates markers must be represented by strobed events. To remove individual markers from the output PLX file, click to clear the **Write?** checkbox. You can also change the event IDs by typing a new value in the **Event ID** column. There are two entries in the list box for each Interval-type marker, one for the start time and another for the end time.
- **What to Export as Strobed Events** - Select one of these items to export:
 - **Original Strobed Events (Passthrough Mode)** – Select this item to pass unchanged the strobed event data blocks from the original neural data file through to the output PLX file. Use this mode when if not interested in representing any changes to any Scalar or Coordinates marker occurrences in the output file, or if there are not any Scalar or Coordinates data to output.
 - **Scalar Marker** – Select this item to represent the values from a single Scalar marker in the strobed events. Select the Scalar marker from the list.

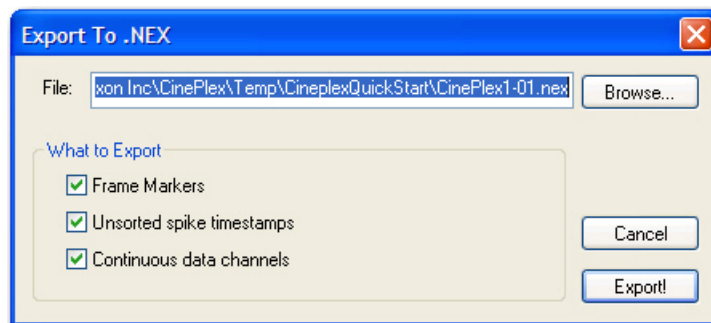
- **Coordinate Markers** – Select one of the following combinations:
 - Click **LED 1**, **LED 2**, or **LED 3** or any combination of these LEDs. For each LED, select a corresponding Coordinates marker from the drop-down list.
 - To export coordinates for the centroid position, click **Centroid Pos** and select a corresponding Coordinates marker from the drop-down list.
 - To include Motion Measure data, click **Centroid Pos** and click a corresponding Coordinates marker from the drop-down list; then click **Motion** and select a corresponding Scalar marker from the drop-down list. For more information on the Motion Measure option, see *CinePlex Behavioral Research System User Guide Version 3*, available at www.plexon.com.

Note: Select only one of the preceding combinations. If an LED is clicked, do not click **Centroid Pos**. Likewise, do not click **Motion** without clicking **Centroid Pos**.

- **Export!** - Click **Export!** to close the dialog box and write the new PLX file.

A.3.1.7 Export to NEX

This item opens the **Export To NEX** dialog box.



- **File** - Type an export file name and path, or click **Browse** and select an existing file.
- **What to Export** - This area includes the following items:
 - **Frame Markers** – CinePlex Editor exports frame markers to the NEX file as just another marker variable. To inhibit this, click to clear the **Frame Markers** checkbox.
 - **Unsorted spike timestamps** – CinePlex Editor exports both sorted and unsorted spike timestamps to the NEX file by default. To export only the sorted spike timestamps, click to clear the **Unsorted spike timestamps** checkbox.

- **Continuous data channels** – By default, the CinePlex Editor exports any continuous channels present in the original neural data file as continuous variables to the NEX file. To prevent continuous data being written to the NEX file, click to clear the **Continuous data channels** checkbox.

- **Export!** - Click **Export!** to close the dialog box and create a new NEX file.

A.3.1.8 Print, Print Preview, and Print Setup

These items are standard Windows print commands. The **Print** command will output the CPJ file to an installed printing device.

A.3.1.9 File list

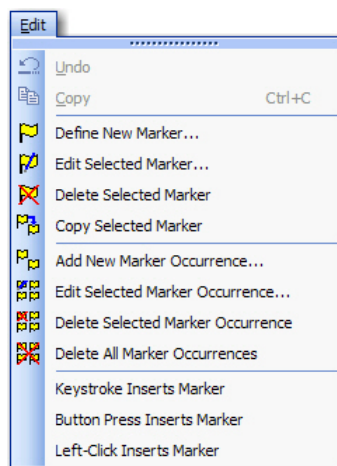
This section includes up to 10 of the most recently opened files.

A.3.1.10 Exit

This item closes all windows and exits CinePlex Editor.

A.3.2 Edit Menu

The following image shows the **Edit** menu.



A.3.2.1 Undo

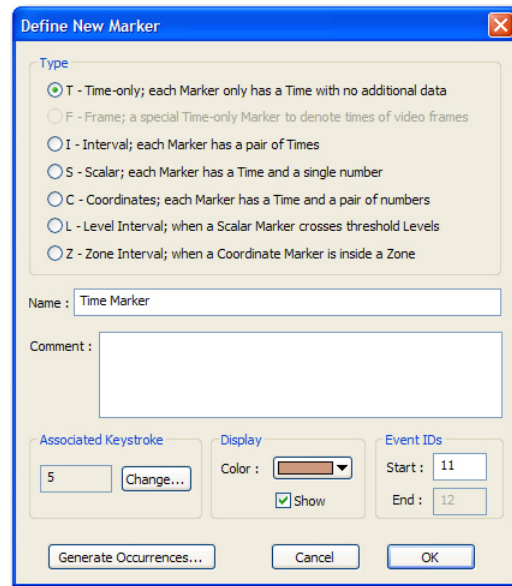
This item provides multiple undo levels. Operations that change the contents of the project file may be undone, but operations that change the user interface options or colors cannot be undone.

A.3.2.2 Copy

This item is the standard Windows copy command.

A.3.2.3 Define New Marker

This item opens the **Define New Marker** dialog box.



- **Type** - In the **Type** area, select a marker type for the new marker. For a description of all marker types, see [Section 3.2, “Marker Types” on page 22](#). Under most circumstances, a new Frame marker cannot be created.
- **Name** - Enter a unique name for the new marker. Marker names must be unique.
- **Comment** - This is an optional box in which to insert a free-form comment that describes the new marker.
- **Associated Keystroke** - This area identifies the keystroke that is associated with this marker, which can be used for finding or inserting new marker occurrences. CinePlex Editor automatically suggests an unused key; click **Change** to open the **Assign Key** dialog box and select a different key. When the dialog box appears, press the key to associate and click **OK**.

Note: Only single-keystrokes (not CTRL- or ALT- key combinations) can be associated with Markers.

- **Display** - This area identifies the display color and the show setting for the marker.
 - **Color** – This box shows the display color this marker in various windows. The color can also be set directly in the Marker window.
 - **Show** – This item toggles the appearance of the Marker in various windows. This item can also be set directly in the Marker window.
- **Event IDs** - This area shows the **Event IDs** associated with the marker. Use these IDs only when exporting this marker to a PLX file. These event IDs are the Plexon external event IDs that represent this marker in the PLX file. For interval-type markers, a second event ID must be specified to represent the end time for the interval.

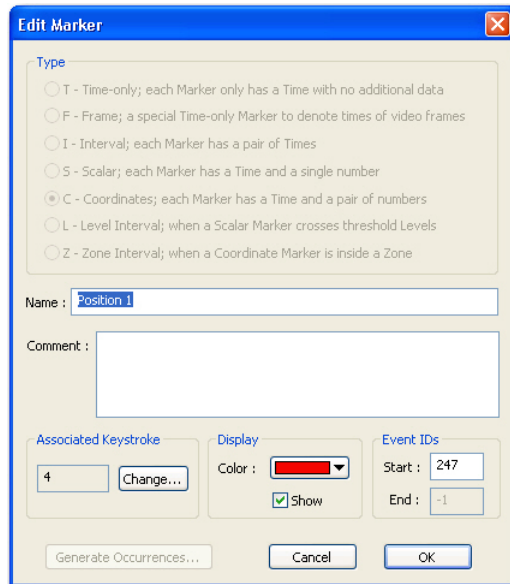
Note: These IDs must be unique across all markers. CinePlex Editor suggests an unused and unique value for these IDs, so they do not usually require immediate attention when first creating the marker. If exporting the data to a PLX file, there will be an opportunity to change these event IDs.

Clicking **Generate Occurrences** causes CinePlex Editor to create the marker and also automatically populate the new marker with algorithmically-generated marker occurrences. The available methods for automatically populating the marker with marker occurrences varies by marker type; for a description, see [Section 3.6, “Automatically Generating Marker Occurrences” on page 31](#).

- **OK** - Click **OK** to close the dialog box and create the new marker.

A.3.2.4 Edit Selected Marker

This item opens the **Edit Marker** dialog box. An image of the dialog box follows:



Note: The **Edit Marker** dialog box may also be opened from the right-click menus in the **Markers** and **_Marker Occurrences** windows.

The marker type for an existing marker cannot be changed. However, it is possible to change the following marker items:

- **Name** - Enter a unique marker name. Marker names *must* be unique. Duplicates are not accepted during the **Add Marker** process.
- **Comment** - Add, add to, or edit a free-form comment that describes the marker.
- **Associated Keystroke** - This area identifies the keystroke that is associated with this marker; click **Change** to open the **Assign Key** dialog box

and select a different key. When the **Assign Key** dialog box appears, press the key to associate and click **OK**.

Note: Only single-keystrokes can be associated with markers. CTRL- or ALT- key combinations are not valid.

- **Display** - This area identifies the display color and the show setting for the marker.
 - **Color** – This box shows the display color of this marker in various windows. Select a new color from the drop-down list.
 - **Show** – This item toggles the appearance of the marker in various windows. Change as needed.
- **Event IDs** - This area shows the **Event IDs** associated with the marker. These event IDs are used when exporting this marker to a PLX file; for more information, see **Event IDs** on [page A-38](#). Change the event IDs as needed.

A.3.2.5 Delete Selected Marker

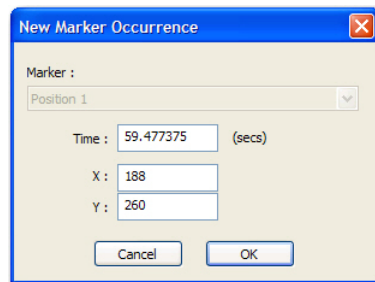
This item deletes the selected marker and all occurrences of that marker.

A.3.2.6 Copy Selected Marker

This item copies the selected marker to the clipboard.

A.3.2.7 Add New Marker Occurrence

This item opens the New Marker Occurrence window.



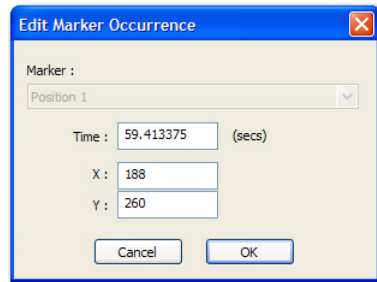
Note: CinePlex Editor identifies marker occurrences by their time, thus no two marker occurrences can have the same time. Adding a new marker occurrence with the same timestamp as an existing marker occurrence replaces the existing marker occurrence with the new one; that is, it is overwritten and the old data values are erased. Editing an existing marker occurrence by changing its timestamp to be the same as another existing marker occurrence replaces the existing marker occurrence.

- **Marker** - This box shows the marker for which a new occurrence is being added.
- **Time** - This is time of the new marker occurrence and its related data values. The data values depend on the marker type. For example, for Coordinates

markers, the **X** and **Y** data values appear as shown in the image, but for Interval markers, start and end times appear.

A.3.2.8 Edit Selected Marker Occurrence

This item opens the **Edit Marker Occurrence** dialog box.



- **Marker** - This box shows the marker whose occurrence is being edited.
- **Time** - This is time of the marker occurrence and its related data values. The data values depend on the marker type. For example, for Interval markers, the start **Time** and **End Time** appear as shown in the image, but for Coordinates markers, X and Y data values appear.

A.3.2.9 Delete Selected Marker Occurrence

This item deletes only the selected occurrence for the marker.

A.3.2.10 Delete All Marker Occurrences

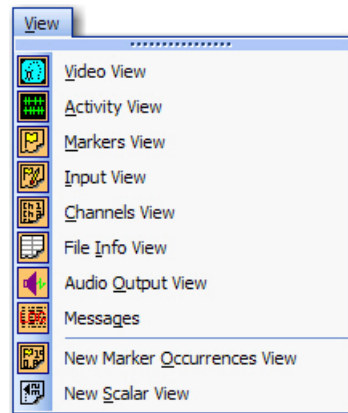
This item deletes all occurrences for the selected marker, but leaves the marker itself intact.

A.3.2.11 Keystroke ..., Button Press ..., and Left-Click Inserts Marker

These items determine which user action inserts markers. For information on marker insertion, see [“Marker Occurrences and the Marker Occurrences Window”](#) on page A-70.

A.3.3 View Menu

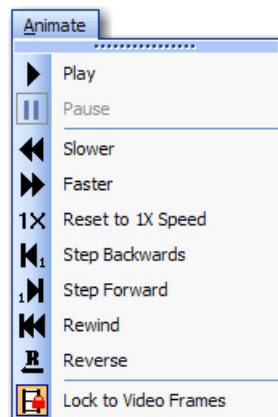
The following image shows the **View** menu.



All the items in this menu open or close a window in the CinePlex Editor display.

A.3.4 Animate Menu

The following image shows the **Animate** menu.



A.3.4.1 Play

This button automatically advances time at a rate determined by the time multiplier. Selecting **Play** when already playing causes a **Pause** condition.

A.3.4.2 Pause

This button halts the automatic advance of time. **Play** and **Pause** are mutually exclusive. Press **SPACEBAR** to toggle between **Play** and **Pause**. Selecting **Pause** when already paused resumes play.

A.3.4.3 Slower

If pressed while playing at any speed, this button slows down the rate of time progression by half until the speed is 1/256 of normal. Continued pressing reverses the direction and increases the speed.

A.3.4.4 Faster

This button speeds up the rate of time progression by a factor of 2. The `UP` `ARROW` key and the `DOWN` `ARROW` key are equivalent to the **Slower** and **Faster** buttons. Continued clicking will eventually cause the speed to reach a maximum of 256 times normal.

A.3.4.5 Reset to 1X Speed

This button sets the rate of time progression to 1X normal speed.

A.3.4.6 Step Backwards

This button advances time to the previous video frame. The `LEFT` `ARROW` key is equivalent to this button.

A.3.4.7 Step Forward

This button advances time to the next video frame. The `RIGHT-ARROW` key is equivalent to this button.

A.3.4.8 Rewind

This button sets the current time to the time of the first video frame.

A.3.4.9 Reverse

This button reverses the flow of time at the current time rate. If already in reverse, it goes forward.

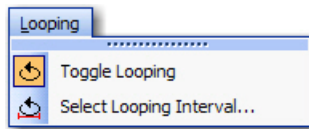
A.3.4.10 Lock to Video Frames

This button advances time by increments of whole frames only. CinePlex Editor does not change the current time at all until enough time has elapsed to make a new video frame the current frame. Then it sets the current time to be the exact time of the frame marker corresponding to that frame. This is the default mode.

Note: A potentially confusing effect occurs when CinePlex Editor is in Frame Locking mode. If the video capture was paused during acquisition so that there is a gap of time that contains no frame marker occurrences, animation appears to freeze at the point where the gap starts until enough time passes such that the next video frame is current, which can be much later. Conversely, when CinePlex Editor is not in Frame Locking mode, the animation continues smoothly through the gap and time advances without regard to video frame boundaries. The video frame remains unchanged until the next one is encountered.

A.3.5 Looping Menu

The following image shows the **Looping** menu.

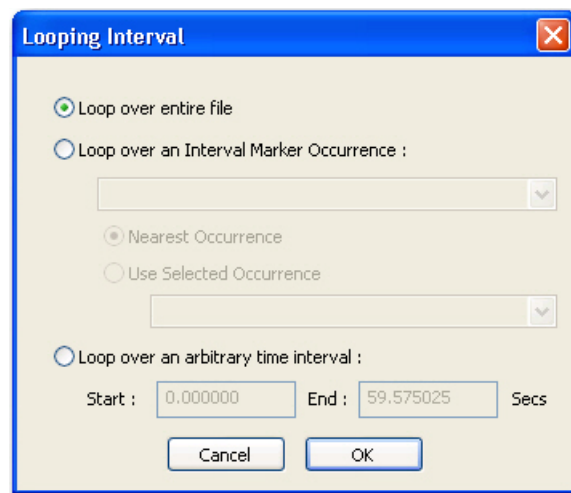


A.3.5.1 Toggle Looping

This item turns looping on or off for the interval selected in the list. Select this option to turn looping on during play back when a specific interval appears that should be reviewed. Playback loops from the beginning to the end of the interval. Click again to resume normal playback.

A.3.5.2 Select Looping Interval

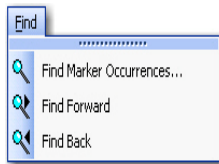
This item opens the **Looping Interval** dialog box to allow a looping interval to be defined. An image of the dialog box follows:



- **Loop over entire file** - This is the default selection. CinePlex Editor plays the file to the end and restarts from the beginning.
- **Loop over an Interval Marker Occurrence** - This selection makes CinePlex Editor loop over the time span defined by a specified occurrence of an interval marker. When selecting this option, choose the interval marker from the drop-down list and then choose the specific occurrence of the interval marker to loop over.
 - **Nearest Occurrence** – uses the occurrence nearest to the current time
 - **Use Selected Occurrence** – uses the specific occurrence selected from the drop-down list
- **Loop over an arbitrary time interval** - This selection makes CinePlex Editor loop over an arbitrary interval of time specified in the **Start** and **End** boxes. Use the Looping toolbar controls to control looping parameters; see [“Looping Toolbar” on page A-66](#).

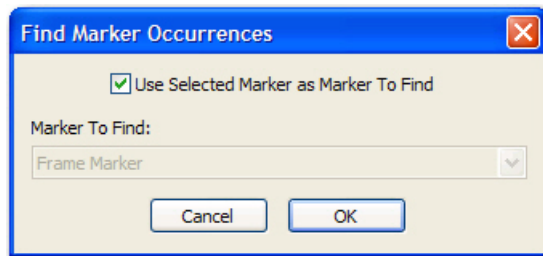
A.3.6 Find Menu

The following image shows the **Find** menu.



A.3.6.1 Find Marker Occurrences

This item opens the **Find Marker Occurrences** dialog box to choose which marker to find. Either find the selected marker or choose from a dropdown list. An image of the dialog box follows:



- **Use Selected Marker as Marker To Find** - By default, CinePlex Editor loads the current marker into the **Marker To Find** list box. To select another marker from the drop list, click to clear the checkbox and select another marker in the **Marker To Find** box.
- **Marker To Find** - Click to clear the **Use Selected Marker as Marker To Find** checkbox and select a marker from the drop-down list.

A.3.6.2 Find Forward

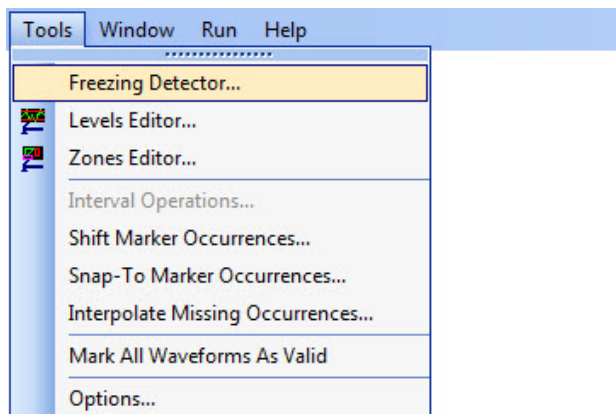
This item searches forward for the next selected marker.

A.3.6.3 Find Back

This item searches backward for the next selected marker.

A.3.7 Tools Menu

The following image shows the **Tools** menu.

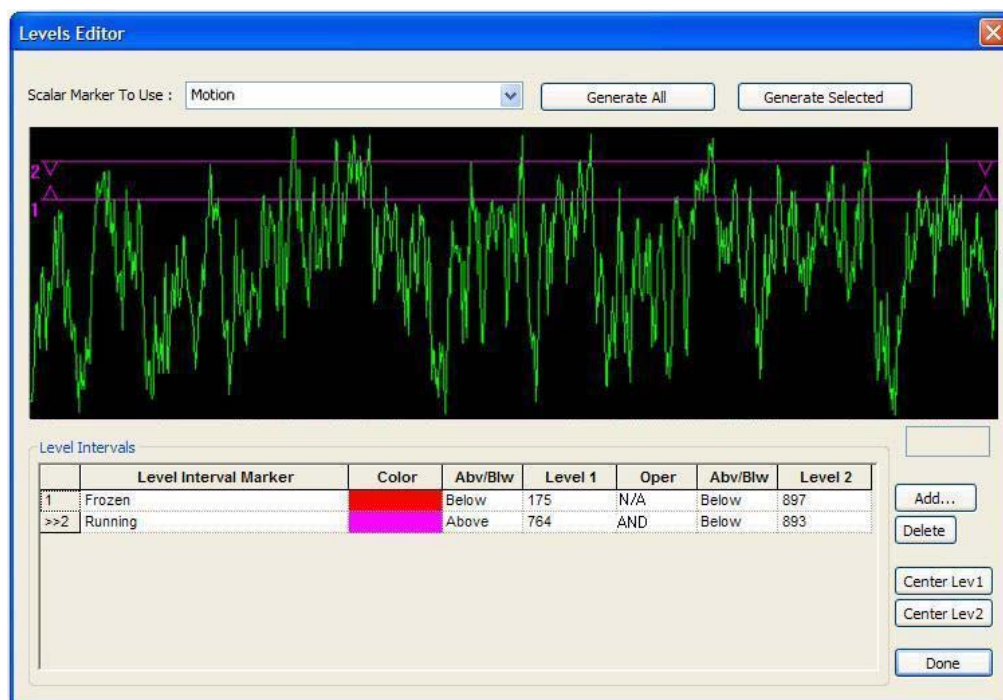


A.3.7.1 Freezing Detector Function

See [Section 4.1](#), “Using the Freezing Detector” on page 46 for details about this function.

A.3.7.2 Levels Editor

This item opens the **Levels Editor** window. Use the **Levels Editor** dialog box to define level interval markers and generate marker occurrences for them. An image of the dialog box follows:



- **Scalar Marker To Use** - This box contains the scalar marker to use for generating levels.
- **Generate All** - This button generates marker occurrences for all the Level Interval markers that appear in the **Level Intervals** box.
- **Generate Selected** - This button generates marker occurrences for the selected level interval, which appears with a >> in the left-most column in the **Level Intervals** box.

Note: Clicking either **Generate All** or **Generate Selected** deletes all existing marker occurrences for the affected Level Interval markers, and generates a new set of occurrences according to the current Scalar marker and conditions.

The graph in the middle of the **Levels Editor** window shows the values of the selected Scalar marker as a function of time. The horizontal range of time that appears is always the entire file. The vertical scaling of the plot always adjusts to show the full range of the scalar data values. The levels appear as horizontal lines on the display, with the above or below setting for each level shown as either upward- or downward-pointing arrows on the lines. The number on the left indicates whether the line represents **Level 1** or **Level 2**.

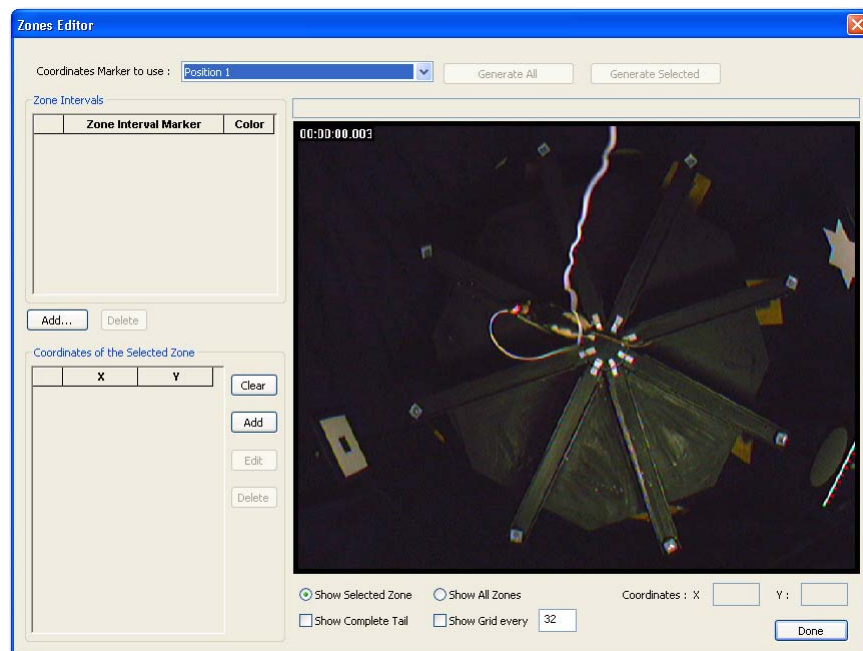
Note: Positioning the mouse pointer inside this portion of the editor causes the scalar value corresponding to the pointer position to appear in the edit box at the bottom right of the display.

- **Level Intervals** - This area contains a grid that has a line for each defined level interval. Select level intervals by clicking in the grid. Set the condition by editing the grid fields. When defining multiple Level Interval markers, only the one selected in the **Level Intervals** box displays. Click any level interval to select it. The selected level interval appears with a >> in the leftmost column of the grid. The columns shown in the grid are:
 - **Level Interval Marker** – This column contains the name of the Level Interval marker. The name can be changed by changing the text in this field.
 - **Color** – This column contains the color associated with the Level Interval marker. To change the color, click in this field to bring up a color selection dialog box.
 - The next five columns together define the condition for the Level Interval marker. The column arrangement forms a condition statement, for example “Above 175 AND Below 200.”
 - **Abv/Blw** – This column contains the above or below indicator for the first level. To change the condition, click in this field to open a drop-down list and select **Above** or **Below**.
 - **Level 1** – This column contains the numerical value for the first level. Type a numerical value in this field or click and drag horizontal line **1** on the graph.

- **Oper** – This column contains the logical operator between the two halves of the condition. The available selections in the drop-down list are **AND**, **OR**, or **N/A**. Selecting **N/A** means that there is only one level in the condition; CinePlex Editor ignores the last two columns and a second line on the graph does not appear.
 - **Abv/Blw** – This column contains the **Above** or **Below** indicator for the second level, which only applies if **N/A** is not selected.
 - **Level 2** – This column contains the numerical value for the second level, which only applies if **N/A** is not selected. Type a numerical value in this field or click and drag horizontal line **2** on the graph.
- **Add** - This button opens the **Define New Marker** dialog box to add a new Level Interval marker.
 - **Delete** - This button deletes the selected interval level.
 - **Center Lev1 and Center Lev2** - By default, CinePlex Editor sets the level intervals to the middle of the display range shown in the graph, which it determines from the range of scalar values encountered for the selected Scalar marker. Click these buttons to re-position the corresponding level line to the center of the view again.
 - **Done** - Click **Done** to close the editor. CinePlex Editor stores the conditions with the Level Interval marker and displays them when the **Levels Editor** re-opens.

A.3.7.3 Zones Editor

This item opens the Zones Editor window. An image of the dialog box follows:



- **Coordinates Marker To Use** - This box lists the Coordinates marker used to define the zone.
- **Generate All** - This button generates marker occurrences for all the level intervals that appear in the **Zone Intervals** box.
- **Generate Selected** - This button generates marker occurrences for the selected Level Interval marker, which is indicated by the >> in the left-most column in the **Level Intervals** box.

Note: Clicking either **Generate All** or **Generate Selected** deletes all existing marker occurrences for the affected Zone Interval markers, and generates a new set of occurrences according to the current Coordinates marker and conditions.

- **Zone Intervals** - This area lists all the defined Zone Interval markers.
 - The leftmost column lists the interval number; the selected Zone Interval marker appears with a >> in the leftmost column.
 - **Zone Interval Marker** – This column lists the names of the Zone Interval markers. Add or change names by typing in this field.
 - **Color** – This column shows the colors of the zone boundaries. To change a color, click the color to open a color selection dialog box.
 - **Add** – This button adds a coordinate to the selected zone.
 - **Delete** – This button deletes the selected Zone Interval marker.
- **Coordinates of the Selected Zone** - This area lists the coordinates of the currently selected Zone Interval marker. The zone of a Zone Interval marker consists of a list of 2D coordinates (**X** and **Y**) that define the closed contour. Define these contours by clicking on the screen image (see **Add** that follows), or by individually adding and typing in the coordinate values in the columns.
 - The leftmost column lists the coordinate number; the selected coordinate appears with a >> in the leftmost column.
 - **X** – This column contains the X coordinate distance from the lower left corner (zero distance).
 - **Y** – This column contains the Y coordinate distance from the lower left corner (zero distance).
 - **Clear** - This button completely clears all points from the current zone. Click **Add** to re-enter the zone.
 - **Add** - This button puts the Zones Editor into the click-to-add mode. The first left-click in the main window defines the first point in the contour, subsequent left-clicks continue to define the contour. A right-click ends the drawing and closes the contour.
 - **Edit** - This button enables the currently selected point to be re-positioned. After clicking **Edit**, move the mouse pointer to the desired location on the main window. The contour continually re-adjusts as the

mouse pointer moves. Left-click to select the new position, or right-click to cancel the operation and revert to the previous position.

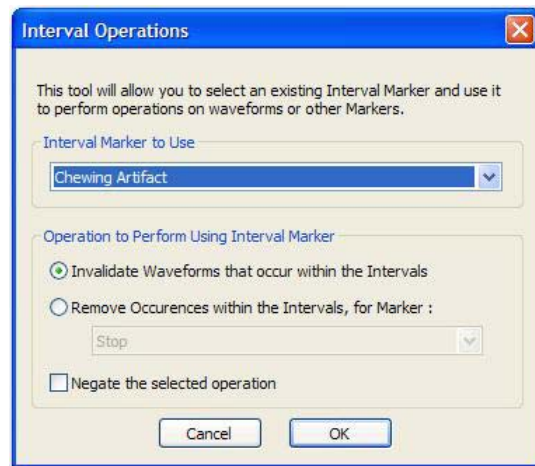
- **Delete** - This button deletes the currently selected point from the zone contour. The contour re-adjusts automatically for the remaining points.

When the **Zones Editor** dialog box is opened, the main view shows the same video frame that the CinePlex System displays. By default, the zone for the currently selected Zone Interval marker appears superimposed on the video frame.

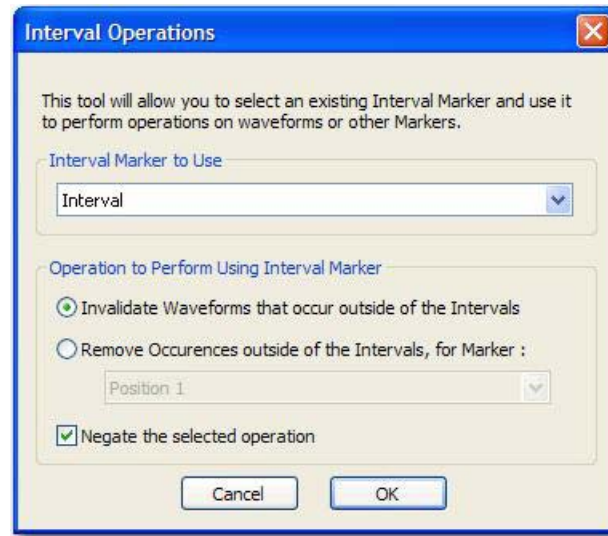
- **Show Selected Zone** - This is the default setting. It shows the zone for the currently selected Zone Interval marker superimposed on the video frame
- **Show All Zones** - Click this button to see all defined Zone Interval marker zones simultaneously.
- **Show Complete Tail** - Click this button to display a line connecting all the positions visited by the selected Coordinates marker. This can help to show what effect various placements of the zone boundaries can have when a zone is defined.
- **Show Grid every** - Click this button to superimpose a grid over the video image. Enter the grid spacing in the box.
- **Coordinates: X Y** - When the mouse pointer moves over the main window, the corresponding coordinates of the mouse pointer appear in the **X** and **Y** edit boxes.
- **Done** - Click **Done** when finished defining zone intervals.

A.3.7.4 Interval Operations

This item opens the **Interval Operations** dialog box.

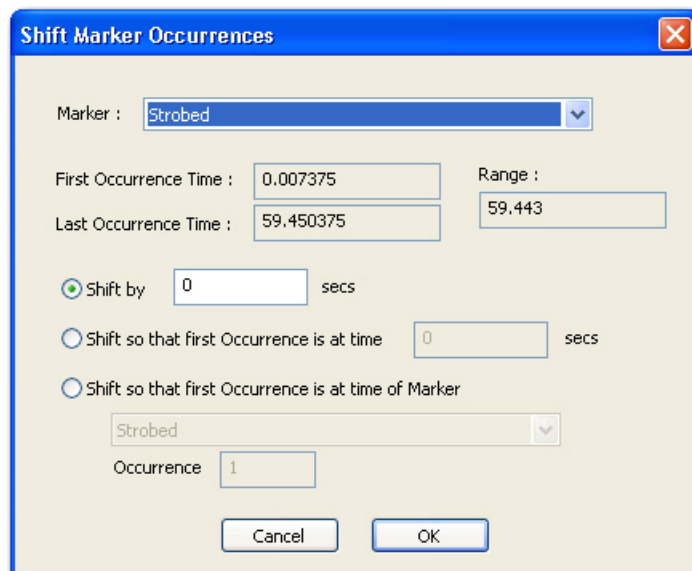


- **Interval Marker to Use** - From the drop-down list, select a marker of the following type:
 - Interval
 - Level Interval
 - Zone Interval
 - **Operation to Perform Using Interval Marker** - In this area, choose one of the following operations:
 - **Invalidate Waveforms that occur within the Intervals** – This selection invalidates all waveforms that occur within (inclusive) the interval marker. CinePlex Editor compares each waveform (spike time) in every channel against all occurrences of the interval marker to see if it falls within the start and end times. If it does, CinePlex Editor marks the waveform as invalid.
 - **Remove Occurrences within the Intervals, for Marker** – This selection removes the occurrences of the marker selected from the drop-list, from within the intervals. CinePlex Editor compares the times of the occurrences of this marker to the selected interval occurrences, and removes any occurrences that fall within (inclusive) of any interval.
- Note:** In both cases, CinePlex Editor considers exact matches of the spike timestamp to the interval occurrence start or end times to be within the interval. For example, if spike time *Tspike* is inside the interval defined by *Tstart* and *Tend*, it means that the condition (*Tspike* >= *Tstart*) and (*Tspike* <= *Tend*) is true.
- **Negate the selected operation** – This selection changes either of the previous selections to an exclusive function. Selecting **Invalidate Waveforms that occur within the Intervals** invalidates all waveforms that do not fall between the start and end times (exclusive) of any interval marker occurrences. Selecting **Remove Occurrences within the Intervals, for Marker** removes all occurrences of the selected marker that do not occur within the times spanned (exclusive) by any interval marker occurrence. The text in the **Interval Operations** dialog changes as follows:



A.3.7.5 Shift Marker Occurrences

This item opens the **Shift Marker Occurrences** dialog box. An image of the dialog box follows:



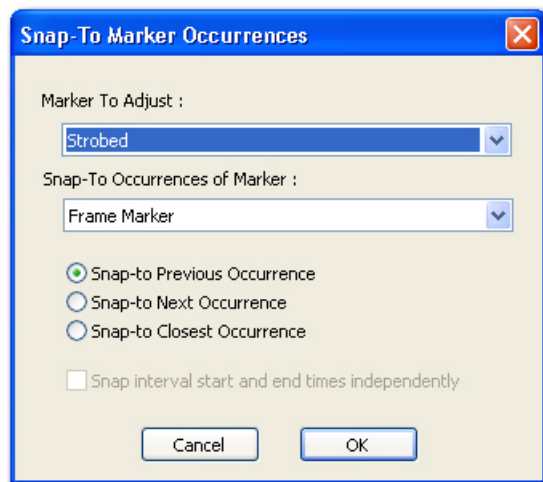
Use this dialog box to add a constant offset, which can be negative, to all timestamps of a marker. It is useful for aligning neural data with the video data.

- **Marker** - Select a marker to shift from the drop-down list.
- **First Occurrence Time** - This is the time that the first occurrence of the marker appears.
- **Last Occurrence Time** - This is the time that the last occurrence of the marker appears.

- **Range** - This is the time span between the first and last occurrences.
- **Shift by _ secs** - This selection shifts the occurrences by a constant amount. Enter the amount of shift directly in the edit box.
- **Shift so that first Occurrence is at time _ secs** - This selection calculates the shift amount by determining how much the first occurrence of the selected marker must be shifted to make it equal to the specified time. CinePlex then applies this shift amount to all occurrences.
- **Shift so that the first Occurrence is at time of Marker** - This selection shifts the time to that of another marker occurrence. Select the shift-determining marker from the drop list.
- **Occurrence** - Enter which occurrence of the shift-determining marker to use by typing its 1-based index into the edit box.

A.3.7.6 Snap-To Marker Occurrences

This item opens the **Snap-To Marker Occurrences** dialog box. An image of the dialog box follows:



The purpose of the “Snap-To” functionality is to shift the occurrences of one marker to match up in time with the occurrences of another marker. However, unlike the [Shift Marker Occurrences](#) functionality described on [page A-52](#), the “Snap-To” functionality can shift each occurrence by a different amount.

- **Marker To Adjust** - From the drop-down list, select the marker occurrences to match up in time.
- **Snap-To Occurrences of Marker** - From the drop-down list, select the marker occurrence to match up to in time.

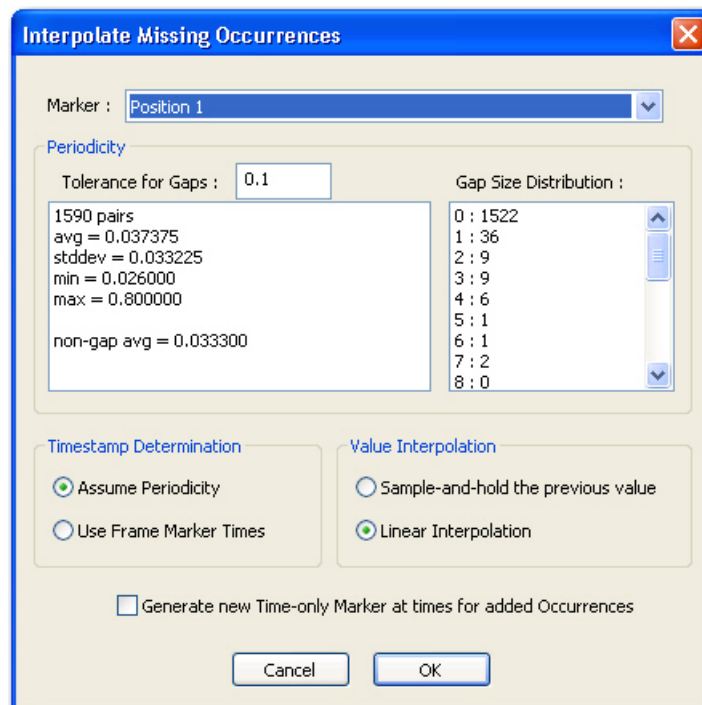
Note: Typically, the **Snap-To Occurrences of Marker** are Frame marker types, which means the **Marker To Adjust** aligns with the times of the video frames.

The CinePlex Editor algorithm find the *best match* occurrence of the **Snap-To Occurrences of Marker** entry for every occurrence of the **Marker To Adjust** entry, and makes the **Marker To Adjust** occurrence time equal to the time of the *best match* occurrence. There are two ways that CinePlex Editor determines the *best match* occurrence of the “Snap-To” marker:

- **Snap-to Previous Occurrence** – This selection uses the occurrence that is just before the time of the occurrence being adjusted. The adjustment always reduces the time of the occurrence being adjusted.
- **Snap-to Closest Occurrence** – This selection uses the occurrence that is closest in time to the occurrence being adjusted. The adjustment can shift the occurrence being adjusted ahead or behind in time.
- **Snap interval start and end times independently** - Because interval-type markers consist of two times (a start time and an end time), they are treated differently and they are controlled by this checkbox. When this box is checked, CinePlex Editor snaps both the start and the end times to their respective *best match* occurrences. This can change the length of the interval. When the checkbox is cleared, CinePlex Editor uses the *best match* to the start time to shift the entire interval. In this case, the end time shifts by the same amount as is the start time, so the length of the interval remains constant.

A.3.7.7 Interpolate Missing Occurrences

This item opens the **Interpolate Missing Occurrences** dialog box. An image of the dialog box follows:



- **Marker** - From the drop-down list, select the marker to interpolate.
- **Periodicity** - This box displays the periodicity results for the selected marker as follows:
 - **Tolerances for Gaps** – For the gap analysis, the average separation between markers is determined. If the time gap between any two adjacent marker occurrences is not within the Tolerance for Gaps value (i.e. between $(1 - \text{TFG})$ and $(1 + \text{TFG})$ times the average separation, it is marked as a gap.
 - **pairs** – the number of pairs of adjacent times
 - **avg** – the average time difference between pairs in seconds
 - **stddev** – the standard deviation around the average time difference
 - **min** – the smallest time difference encountered in seconds
 - **max** – the largest time difference encountered in seconds
 - **non-gap avg** – the average time difference in seconds when the discovered *gaps* are excluded from the calculation
- **Gap Sizes** - This box lists of the distribution of skipped occurrences (gaps); for example, **0 : nnn** indicates the number of number of pairs without a missing timestamp between them, **1 : nnn** indicates the number with one timestamp missing, **2 : nnn** indicates the number with two missing timestamps, and so on.
- **Timestamp Determination** - The area contains the following two selections:
 - **Assume Periodicity** – This selection assumes that the data is periodic and adds marker occurrences accordingly.
 - **Use Frame Marker Times** – This selection adds missing marker occurrences at the frame markers.
- **Value Interpolation** - The area contains the following two selections:
 - **Sample-and-hold the previous value** – This selection assigns a value (or coordinates) to the new marker occurrences added to fill a gap, which is the same as the value (or coordinates) of the last pre-gap marker occurrence.
 - **Linear Interpolation** – This selection assigns values to the new marker occurrences added to fill a gap that are calculated to fall on a line connecting the last pre-gap value (or coordinates) with the first post-gap value (or coordinates).

If the marker being interpolated is a scalar marker or a coordinates marker, the tool can calculate reasonable values to apply to the added marker occurrences by using one of two methods:

Generate new Time-only Marker at times for added Occurrences

This selection enables the tool to define and populate a new marker named *Interpolated X*, where *X* is the name of the marker being interpolated, and which has occurrences at the times where interpolated marker occurrences are added. In effect, this differentiates the occurrences of the selected marker that are generated via interpolation from those that are part of the original data.

How the Interpolation Algorithm Works

The interpolation tool is capable of calculating both the times at which new marker occurrences need to be added (that is, where the gaps appear), and for Scalar markers and Coordinates markers, what values need to be given to the added marker occurrences. Obviously, when finding the times where there are gaps, there is an implicit assumption of periodicity in the marker occurrences. This may or may not be the case with the marker occurrences for the selected marker, but the tool displays information that helps to determine the extent to which the periodicity assumption is valid.

When a marker is selected, the algorithm analyses the times of the occurrences for that marker, and displays the results in the two list boxes. The algorithm can use or ignore the results of this analysis, depending on the following **Timestamp Determination** selections. The analysis proceeds as follows:

- 1 Consider each pair of adjacent times for the marker occurrences, and calculate the time difference between each pair. The number of pairs appears in the left list box.
- 2 Find the min, max, average, and standard deviation on the set of calculated time differences. Display this information in the **Periodicity** list box as **avg** = for the average time difference, **stddev** = for the standard deviation around the average time difference, **min** = and **max** = for the smallest and largest time differences encountered.
- 3 Assume that any difference between adjacent occurrences that is larger than 1.1 times the average time difference constitutes a *gap*, or a skipped occurrence. Using this definition of a *gap*, compute and display a histogram of the sizes of the gaps in the **Gap Sizes** list box. The **0:** line in this list box is to be interpreted as the number of timestamp pairs for which there were no *gaps* or missing timestamps between them. The next **1:** line is the number of timestamp pairs for which there was a gap of 1 missing timestamp between the pair, and so on.
- 4 By ignoring the gaps, compute a new average time difference between adjacent, gap = 0 timestamp pairs. Display this as **non-gap avg** = in the **Periodicity** list box. Whereas the **avg** = value has factored in the gaps and thus produced a larger average time difference, the **non-gap avg** = has taken

out the gaps, and so produces a smaller and in many cases more accurate estimate of the true periodicity. In effect, this is the periodicity that would be seen if it weren't for missing samples (gaps) in the occurrences.

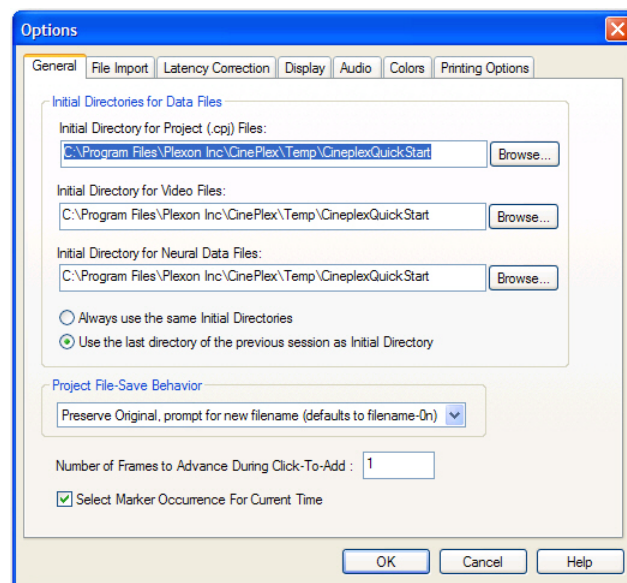
A.3.7.8 Mark All Waveforms As Valid

This item re-validates any waveforms that were invalidated with the Interval Operations tool; see [“Interval Operations” on page A-50](#).

A.3.7.9 Options

This item opens the **Options** dialog box with several tabs as described in the following sections.

A.3.7.10 General Tab

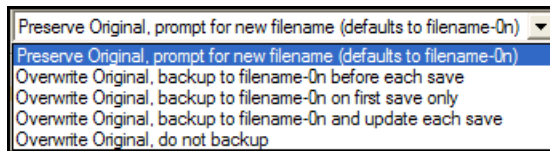


- **Initial Directories for Data Files** - This area contains list boxes and controls for the initial project directories as follows:
 - **Initial Directory for Project (CPJ) Files** – Type a directory location and name or click **Browse** and select an existing directory.
 - **Initial Directory for Video Files** – Type a directory location and name or click **Browse** and select an existing directory.
 - **Initial Directory for Neural Data Files** – Type a directory location and name or click **Browse** and select an existing directory.
 - **Always use the same Initial Directories** – This selection sets the default initial directories to the directories entered.
 - **Use the last directory of the previous session as Initial Directory** – This item sets the default initial directories to the directories used for the last project.

A CinePlex Editor User Interface

Note: If you move the original neural data or video files to the same folder on which the CPJ file resides, CinePlex Editor will find them automatically when it reopens the project file. If you move the original neural data or video files to some other location on the hard drive, CinePlex Editor prompts to locate the files when it reopens the project file.

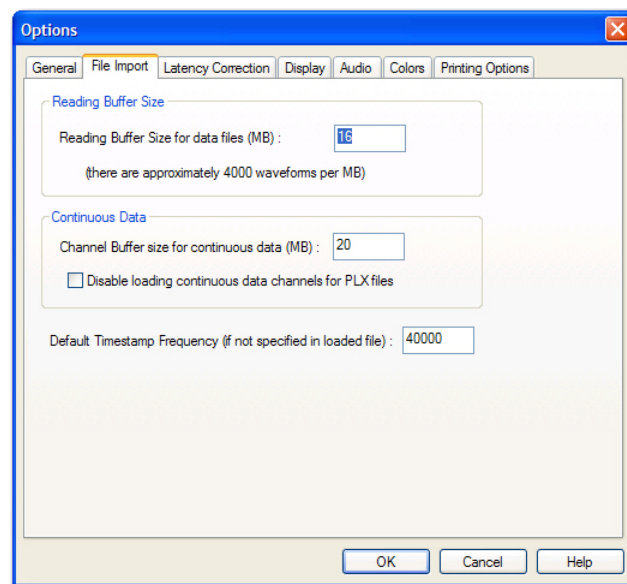
- **Project File-Save Behavior** - When a project file is saved, from the drop-down menu you may set one of the following default file-save behaviors:



Note: On this menu, *filename-0n* means CinePlex Editor defaults to the first unused filename and adds a numeric increment 0 (zero) n (digit). For example, *Test-01*, *Test-02*, *Test-03*, etc.

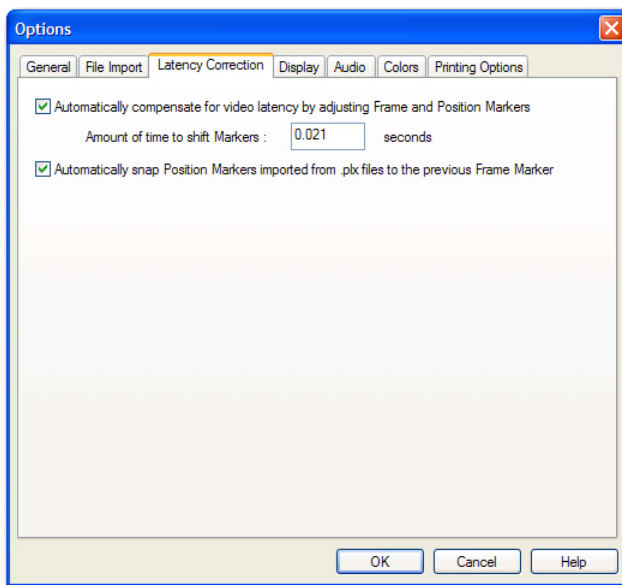
- **Number of Frames to Advance During Click-To-Add** - Type the number of frames to advance when adding or editing coordinates in the Video or Scalar windows. For more information on Click-To-Add, see [Section , “Understanding Click-To-Add Mode” on page 27](#).
- **Select Marker Occurrence For Current Time** - Select this item to have CinePlex Editor automatically select, in the Marker Occurrences window, the most appropriate marker occurrence for the current time.

A.3.7.10.1 File Import Tab.



- **Reading Buffer Size** - This area contains an input box for the reading buffer size setting and an advisory estimate of the amount of space waveforms take.
 - **Reading Buffer Size for data files (MB)** – Type a size value for the reading buffer in megabytes (MB).
- **Continuous Data** - This area contains an input box for the size of the continuous-data channel buffer and a checkbox that disables the loading of continuous-data channels to PLX files.
 - **Channel Buffer size for continuous data (MB)** – Type a size value for the channel buffer in megabytes (MB).
 - **Disable loading continuous data channels for PLX files** – This selection inhibits the loading of continuous data channels to PLX files.
 - **Default Timestamp Frequency (if not specified in loaded file)** – If the initial neural data file does not specify a timestamp frequency (for example, a DVT file), enter a default timestamp frequency in Hz.

A.3.7.10.2 Latency Correction Tab. For more details on latency correction, see [“Correcting for Video Latency with CinePlex System Version 2”](#) on page A-72.



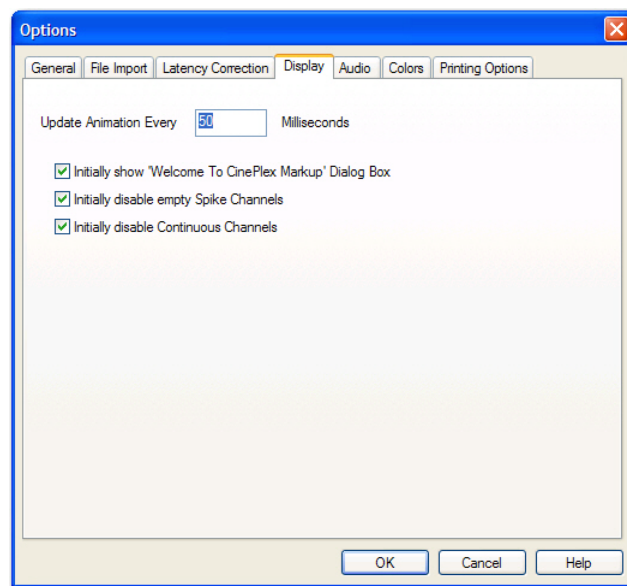
- **Automatically compensate for video latency by adjusting Frame and Position Markers** - this setting is checked by default. This setting compensates for the amount of time elapsed between the camera's capture of the image to the computer's timestamp of the video frame (the video latency). If there is data that was analyzed with previous versions of CinePlex Editor, there may be timestamp shifts and this setting could be unchecked for that data.

- **Amount of time to shift Markers** - Type the amount of time to shift the markers in seconds. The number should always be positive because the number is subtracted from the timestamps.

- **Automatically snap Position Markers imported from PLX files to the previous Frame Marker** - this setting is checked by default. This setting is applied automatically only when data is initially imported from a PLX file.

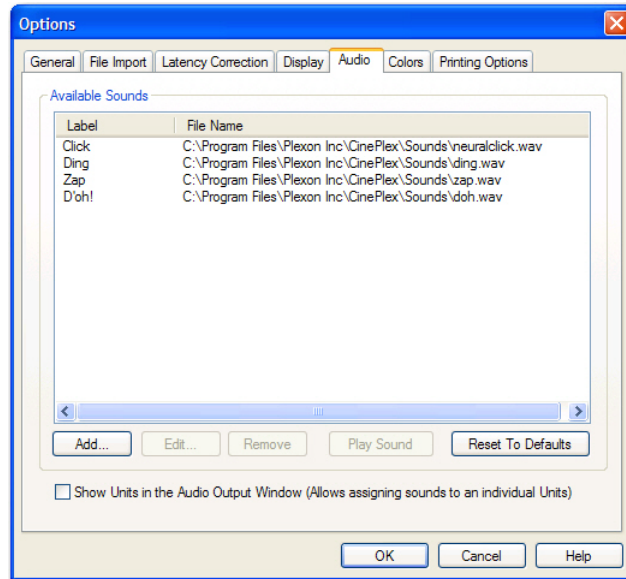
Note: When CinePlex is being used with Plexon's MAP system, leaving the MAP on overnight could result in excessive latency - much greater than 30 milliseconds. If the MAP has been left on overnight, it is better to reset the MAP system.

A.3.7.10.3 Display Tab.

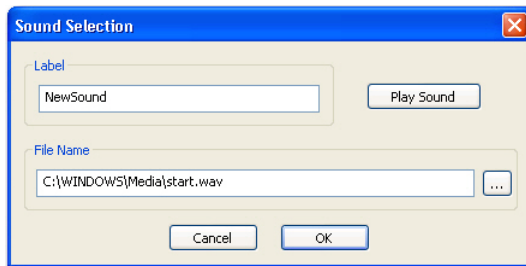


- **Update Animation Every __ Milliseconds** - Type an animation update frequency in milliseconds. This is the screen update rate while the video and data files play are playing.
- **Initially show 'Welcome To CinePlex' dialog box** - This selection makes the **Welcome to CinePlex** dialog box appear at startup.
- **Initially disable empty Spike Channels** - This selection suppresses empty spike channels in the **Activity** window at startup.
- **Initially disable Continuous Channels** - This selection suppresses continuous channels in the **Activity** window at startup.

A.3.7.10.4 Audio Tab.



- **Available Sounds** - CinePlex Editor ships with a selection of four WAV files, and these sounds are available for playback in CinePlex Editor by default. However, any WAV file can be used, provided that CinePlex Editor knows where to find it on the hard drive. Before WAV file sounds can be mapped to Marker or spike occurrences in the Audio Output Window, they must be loaded into CinePlex Editor. The **Available Sounds** section lists the Sounds that are currently available for playback. Each sound has a Label that shows up in the droplist in the **Sounds** column of the Audio Output Window, and the full path to the WAV file that contains the sound.
- **Add** - Pressing Add... will show a file selection dialog followed by the Sound Selection dialog box which allows entering a Label used to represent that sound. Pressing the **Play Sound** button will play the sound, which is useful for previewing.



- **Edit** - Highlighting an existing sound in the list and pressing Edit... will show the Sound Selection dialog box and allow re-selecting the WAV file or changing the Label for a sound.
- **Remove** - Highlighting an existing sound in the list and pressing Remove will remove the sound.

A CinePlex Editor User Interface

- **Play Sound** - Highlighting an existing sound in the list and pressing Play Sound will immediately play the sound, allowing it to be previewed.
- **Reset to Defaults** - Pressing the Reset to Defaults button will reset the list to contain the four sound files that are shipped with CinePlex Editor.



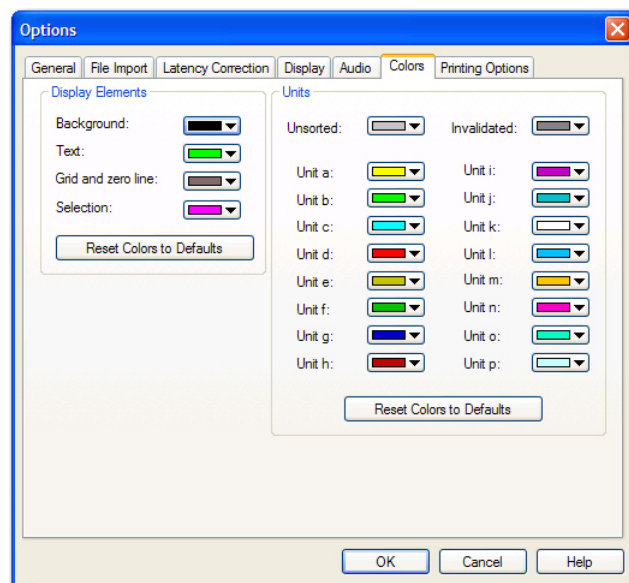
HINT

Minimizing number of sounds to play

Computer audio hardware can only mix a certain number of sound streams together, so CinePlex Editor can only play about 10 sounds simultaneously. Sounds that overlap in time because they are played quickly one after the other count as simultaneous sounds. Therefore, it is quite easy for CinePlex Editor to overwhelm the audio subsystem by attempting to play too many sounds, as Markers or neural firings may occur at rates too fast for the audio system's capabilities. When this happens, CinePlex Editor will play as many sounds as it can, but there may be gaps in the audio playback. To minimize this issue:

- a) do not select many units or markers to be played at once. Even a single neural channel with a high firing rate can saturate the audio.
- b) use WAV files that are as short as possible. In this regard the 'neuralclick.wav' file is ideal, as it can be played very quickly.

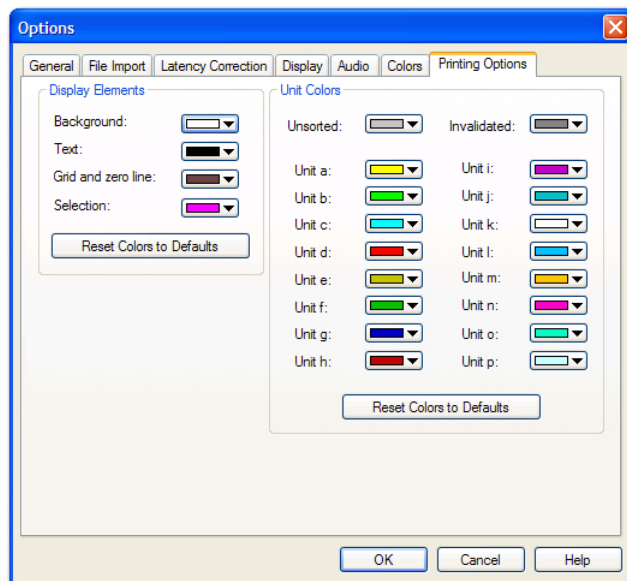
A.3.7.10.5 Colors Tab.



- **Display Elements** - This area contains the following color choices for the main display:
 - **Background** – This is the background color of the Activity window.

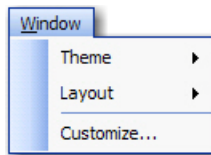
- **Text** – This is the text color in the Activity and Video windows.
- **Grid and zero line** – This is the color of the grid and zero line in the **Activity** windows.
- **Selection** – This is the color of selected items in the Video and Activity windows.
- **Restore Colors to Defaults** – Click to restore the display elements to their default colors.
- **Units** - This area contains the color choices for each unit and unsorted waveforms.
 - **Unsorted** – This is the color for unsorted waveforms.
 - **Invalidated** - This is the color for invalidated waveforms.
 - **Unit a: ... Unit p** – These are the color selections for up to 16 units.
 - **Restore Colors to Defaults** – Click to restore the unit colors to their default colors.

A.3.7.10.6 Printing Options Tab.



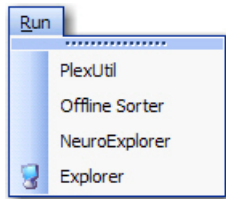
The selections on the **Printing Options** tab are the same as those on the **Colors** tab. See [“Colors Tab” on page A-62](#)

A.3.8 Window Menu



For more details on the **Window** menu, see [Window Menu](#), above.

A.3.9 Run Menu



A.3.9.1 PlexUtil

This item launches the PlexUtil application.

A.3.9.2 Offline Sorter

This item launches the Offline Sorter application.

A.3.9.3 NeuroExplorer

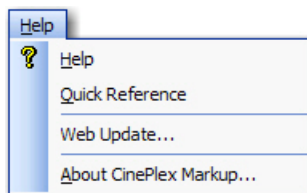
This item launches the NeuroExplorer application.

A.3.9.4 Explorer

This item opens Windows Explorer.

See also [Run Menu](#), above. and [“Run Menu Customization”](#) on page B-20.

A.3.10 Help Menu



For more details on the **Help** menu, see [“Help Menu”](#) on page B-12.

A.4 Toolbars

CinePlex Editor includes toolbars that provide access to features, commands, controls, and settings. Most features and commands are available on the toolbars. It is also possible to create toolbars from most of the dropdown menus on the menu bar. Briefly rest the mouse pointer over a button to see the button name. Descriptions of the toolbars follow:



A.4.1 Standard Toolbar

This toolbar includes typical Windows controls for file **New**, **Open**, **Save**, **Cut**, **Copy**, **Paste**, **Print**, **Help**, **Undo**, and **Options**. Except for **Options**, these are typical Windows controls. For information on **Options**, see [“Options” on page A-57](#).



A.4.2 Edit Toolbar

The **Edit** toolbar includes a series of buttons that manage markers and marker occurrences within CinePlex Editor. This toolbar has eight buttons that correspond to the marker and marker occurrences commands on the **Edit** menu; see [“Edit Menu” on page A-37](#).



A.4.3 Views Toolbar

The **Views** toolbar includes a series of buttons that open the various windows within CinePlex Editor. Each window opens at its default size. This toolbar's buttons are equivalent to the commands on the View menu; see [“View Menu” on page A-42](#).



HINT

Missing Buttons on the ViewsToolbar

If there are missing buttons on the toolbar, select **Window | Customize | Toolbars**, and select the line labeled **View** in the list box in the **Toolbars** tab. Do not uncheck the checkbox -- just select the line. Then press the **Reset** button.

A.4.4 Animate Toolbar

The most convenient way to control the flow of time in CinePlex Editor is to use the time-control toolbar buttons. The associated **Animate** menu entries or

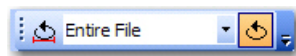
keyboard shortcuts may also be used; see [“Animate Menu” on page A-42](#). The **Animation Speed** list box is the only **Animate** toolbar control that has no equivalent command on the **Animate** menu.



- **Animation Speed** - This list box provides a choice of time progression rates, where 1X is the normal speed. It has no equivalent on the **Animate** menu.

A.4.5 Looping Toolbar

The **Looping** toolbar includes a list of looping intervals over which the video file may be played, and two looping control buttons. The equivalent **Looping** menu entries or keyboard shortcuts may also be used; see [“Looping Menu” on page A-43](#).



A.4.6 Find Toolbar

The **Find** toolbar provides a drop down list that includes all markers. The equivalent **Find** menu entries or keyboard shortcuts may also be used; see [“Find Menu” on page A-45](#).



By default, the currently selected marker appears in the list box. However, another marker may be selected from the drop down list.

A.4.7 Tools Toolbar

The **Tools** toolbar includes two time-interval editors. One editor for a defined zone of the video window and one editor for level interval markers. The equivalent commands on the **Tools** menu may also be used; see [“Tools Menu” on page A-46](#).



A.5 How CinePlex Editor Creates Initial Project Files

When a new CinePlex project is created, CinePlex Editor reads both the neural data file and the video data file, and it generates markers and marker occurrences based on the contents of the files. After the initial file reading, CinePlex Editor stores the generated markers and marker occurrences in the project (CPJ) file. When the project file is re-opened, CinePlex Editor reads the markers and marker occurrences from the project file, not from the original neural data or video files. In this way, you may add, edit, shift, or delete markers without regard for what is actually in the original neural or video data files. However, when an existing project file is re-opened, CinePlex Editor still reads the neural data file in order to obtain the spike timestamps and continuous data, and it still reads the video file to obtain video frame images.

A.5.1 Reading Video (AVI) Files

When CinePlex Editor reads the video (AVI) file, it looks for timestamps embedded in the data stored with each frame. CinePlex Studio imbeds these timestamps. If the embedded timestamps are present, CinePlex Editor creates a special Frame marker, and it generates a marker occurrence for each video frame. See [“Non-Typical Initial File Creation” on page A-68](#) if there are no embedded timestamps.

A.5.2 Reading Plexon (PLX) Files

When CinePlex Editor reads a Plexon PL2 (or PLX) file during the initial project creation, depending on the contents of the PL2 (or PLX) file, it can create and populate a number of different markers as follows:

- Non-strobed external events (type 4 data blocks) become Time-Only markers
- Strobed events become a single Scalar marker, with the scalar values set to the strobe values
- If strobed events are present, and CinePlex Editor identifies them to be in conformance with the Plexon VideoTracker protocol, then CinePlex Editor generates additional markers by interpreting the strobe codes as data produced by Plexon VideoTracker. Depending on the VideoTracker mode detected, CinePlex Editor creates the following markers:
 - One, two, or three Coordinates markers with names like *Position n* to denote the tracker positions, when VideoTracker is in LED, Color Markers or Extended Tracking of Color Markers modes.
 - A Coordinates marker named *Centroid Position*, when VideoTracker is in Object Contour tracking mode.
 - A Scalar marker named *Centroid Motion*, when the VideoTracker Motion Measure option is enabled.

Note: In Plexon VideoTracker protocol, if VideoTracker cannot locate the object being tracked it reports the positions for those frames as (0,0); for example, if a headstage cable occluded the LED for a frame VideoTracker reports that frame

as “0,0”. When CinePlex Editor translates strobed events into Coordinates marker occurrences, it automatically ignores any (0,0) coordinates, which leaves gaps where there is no position data. The Interpolate Missing Occurrences tool can fill these gaps, see [“Interpolate Missing Occurrences” on page A-54](#).

Note: Important: Spike waveforms and timestamps and continuous data from a PL2 (or PLX) file are not converted into markers.

A.5.3 Reading NeuroExplorer NEX Files

When CinePlex Editor reads a NEX file during the initial project file creation, it ignores the spike timestamps and continuous data. CinePlex Editor converts other NEX variables into CinePlex markers as follows:

- Event variables become Time-Only markers, unless the event variable has the exact name *Frame Marker*, in which case it becomes a Frame marker.
- NEX interval variables become interval markers.
- NEX marker variables that have one associated value become Scalar markers.
- NEX marker variables that have two associated values become Coordinates markers.
- CinePlex Editor ignores NEX marker variables with more than two associated values, and NEX population vector variables.

A.5.4 Reading Digital VideoTracker (DVT) Files

When CinePlex Editor reads a DVT file produced by CinePlex Studio during the initial project file creation, it always creates Frame marker occurrences. CinePlex Editor also produces Coordinates and Scalar markers for the coordinate and centroid motion data streams in the file, in a manner analogous to how it translates the strobed values into markers in a PL2 (or PLX) file.

After creating the initial project, you may import additional markers from additional data files into the project; see **Import Markers** on [page A-31](#). The import operation also follows the preceding rules.

A.5.5 Non-Typical Initial File Creation

The normal operating mode for CinePlex Editor is to use an AVI file captured with CinePlex Studio so that frame timestamps are embedded in the AVI file; then load a neural data file that contains neural firing timestamps. However, other modes of operation may be used:

- When using the New Project Wizard, leave either the video-file filename or the neural-data filename blank, but not both. In effect, this allows CinePlex Editor to be used to annotate video data without the presence of neural data, and vice versa.
- If the video data file is blank, the CinePlex Editor Activity window may still be used. If the neural data file contains VideoTracker coordinates that are

based the Plexon VideoTracker protocol, CinePlex Editor still interprets them as Coordinates marker occurrences and displays them against a blank background in the video window. However, it requires an extra step in this case to generate Frame markers artificially. The New Project Wizard detects when this needs to be done, and it automatically prompts.

- If the neural data filename is blank, CinePlex Editor still functions; the video can be viewed in the normal way: advance frame by frame, animate, etc.

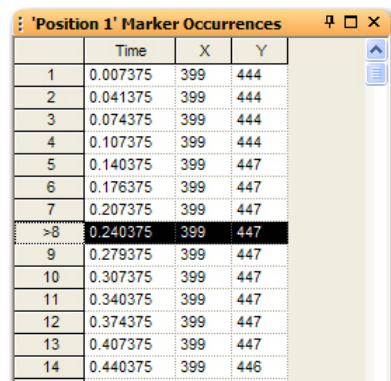
Note: In both of the previous cases, new markers can still be entered and defined. It is still possible to export the markers to any of the supported output-file formats.

- CinePlex Editor supports the use of AVI files recorded without CinePlex Studio, which therefore does not contain embedded timestamps. To use these files, Frame markers must be generated before using CinePlex Editor.
- CinePlex Editor can also read certain other AVI files, but those AVI files must use the Motion JPEG method for encoding and storing the video frames.

A.6 Marker Occurrences and the Marker Occurrences Window

This section includes descriptions of CinePlex Editor facilities for displaying, generating, and editing marker occurrences.

The Activity window graphically shows where marker occurrences occur in time. The Video window and the Scalar window each show the data values associated with Coordinates and Scalar markers. But the Marker Occurrences window (see [“Marker Occurrences Window” on page A-22](#)) contains a concentration of functionality for dealing with marker occurrences. The following Marker Occurrences window shows the numerical values of the marker occurrences for **Position 1**.



The screenshot shows a window titled "'Position 1' Marker Occurrences" with a standard Windows-style title bar (minimize, maximize, close). The window contains a table with four columns: an index column, 'Time', 'X', and 'Y'. The table has 14 rows of data. The 8th row is highlighted with a black background. The data in the table is as follows:

	Time	X	Y
1	0.007375	399	444
2	0.041375	399	444
3	0.074375	399	444
4	0.107375	399	444
5	0.140375	399	447
6	0.176375	399	447
7	0.207375	399	447
>8	0.240375	399	447
9	0.279375	399	447
10	0.307375	399	447
11	0.340375	399	447
12	0.374375	399	447
13	0.407375	399	447
14	0.440375	399	446

This image show the currently selected marker occurrence with a > in the leftmost column. The shortcut menu (see [“Marker Occurrences Window” on page A-22](#)) provides several operations that can be performed on marker occurrences. You may use other shortcut menu entries to select and copy text with marker occurrence information onto the Windows clipboard, and paste into other applications. In the Marker Occurrences window, the columns change according to the selected marker type as follows:

Table A-1 Column Displays for Various Marker Types

Marker Type	Columns
Time Only, Frame	Time
Interval, Level Interval, Zone Interval	Start time, end time
Scalar	Time and value
Coordinates	Time, X, and Y

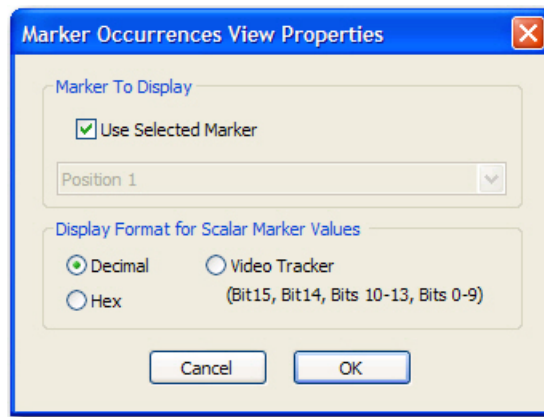
Note: Marker Occurrences are *identified* by time, so no two marker occurrences can have the same time. Attempting to add a new marker occurrence with the same timestamp as an existing marker occurrence causes CinePlex Editor to replace the existing marker occurrence with the new one, which deletes the old data values by overwriting them. Likewise, if an existing marker occurrence is edited

by changing its timestamp to be the same as another existing marker occurrence, CinePlex Editor replaces the existing marker occurrence.

Also, when Scalar markers appear in the Marker Occurrences window, you can control the display format of the data values associated with each marker occurrence. You can use the shortcut menu items to display data values in decimal (the default), hexadecimal, or as Plexon VideoTracker bit fields, where the information appears as comma separated items as follows:

Bit15, Bit14, Bits 10 through 13, Bits 0 through 9

From the Marker Occurrences window shortcut menu, you can select **Properties** to open the **Marker Occurrences View Properties** dialog box:



By default, the dialog box displays the marker occurrences for the currently selected marker. However, you can click to clear the **Use Selected Marker** checkbox and select a different marker from the list to display the marker occurrences for that marker. When **OK** is clicked, the current **Marker Occurrences** window will switch to the one selected in the dropdown list. If there are more than one **Marker Occurrences** window open, this capability can be used to display marker occurrences for different markers simultaneously.

In the **Display Format for Scalar Marker Values** area, you can set the display format for Scalar marker values, which are described in Table A-1 on page 70. In the Marker Occurrences window, the items in the **Value** column change the display format chosen.

By default, whenever the current time is changed in CinePlex Editor, it automatically selects the most appropriate marker occurrence of the selected marker for the current time. However, this behavior can be turned off; from the **Tools** menu, click **Options** and then click the **General** tab; click to clear the **Select Marker Occurrence For Current Time** checkbox.

A.7 Correcting for Video Latency with CinePlex System Version 2

If CinePlex Editor is being used to display data obtained using CinePlex Studio V2, be aware that there is a latency between the times of the video frames / position data sent from CinePlex Studio and the Neural Data. There is no latency when video files are recorded by CinePlex Studio V3 or later in conjunction with the pre-requisite versions of Rasputin (MAP systems) or PlexControl (OmniPlex Systems). In those cases, no latency corrections are needed.

Understanding Timestamps for the Integrated CinePlex/OmniPlex[®] System

The timestamp on a video frame is the time the shutter opens. The shutter remains open for the entire time of the exposure. Depending upon cameras, this can be from about 1 microsecond to the maximum time allowed for the frame rate selected. Light that hits the sensors during the exposure time is accumulated until the shutter closes. Therefore, the video data in a frame is the accumulated image that the sensor saw over the shutter-open period that started at the timestamp. This differs from neural data that is an instantaneous reading of voltage observed by the D/A converter at that instant in time.

Synchronized CinePlex/OmniPlex System video and neural data systems (when operated correctly) have video timestamps that are precisely synchronized with neural data timestamps for concurrent recordings. This synchronization occurs because both the CinePlex System and OmniPlex System are driven by the same clock and reset signals, and because the camera shutter openings are triggered at precise times. Sophisticated hardware and software in the CinePlex/OmniPlex System ensures synchronicity even over extended recording periods of several days. These systems currently require Plexon OmniPlex hardware and software together with CinePlex V3 hardware and software running on the same PC. Up to four triggered cameras (currently AVT) are also required. Timestamp granularity is 25 microsecond. The first frame timestamp is exactly one frame time after recording starts. Position and event data is computed for every frame and tagged with that frame's timestamp.

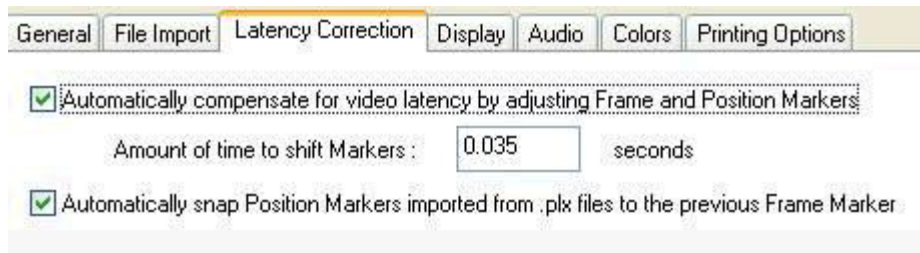
Understanding Video Frame Latency

In CinePlex Studio, the camera takes some time to acquire and transmit each video frame to the Capture computer over the firewire cable. The CinePlex Studio computer will timestamp the frame as soon as it receives notification from the camera that the frame has been delivered, but our tests indicate that the camera takes approximately 21 milliseconds after the 'shutter' closes to deliver the frame. Therefore, the timestamps of the video frames and of the position data from CinePlex Studio are about 21 milliseconds after the actual frame. One way to think about this is that if something suddenly happens in the experimental arena, say an LED suddenly turns on, the video frame that first shows the LED illuminated will have a timestamp that is about 21 milliseconds later. Note also that there can be substantial jitter in this number, depending on when the LED turned on in relation to when the 'shutter' opened in the camera.

Also, there is a systematic offset that can add a constant amount to the latency of each frame, having to do with the exact time that is taken to be zero in the AVI file versus the PLX file recorded on a Plexon NDAQ or the Plexon Recorder system. Because of this effect, the video latency for Recorder is measured to be closer to 33 milliseconds.

Using the CinePlex Editor Latency Correction Feature

CinePlex Editor contains a feature that will automatically subtract some amount of time from each video frame timestamp and each position timestamp when a project is first created. To activate this feature, select the **Latency Correction** tab of the **Tools – Options** dialog box and check the **Automatically compensate for video latency by adjusting Frame and Position Markers** box, and enter a amount of time to subtract from each timestamp:



The amount of time specified is always subtracted from the timestamps, so the entered number should always be positive. Note that this subtraction will only occur when the project is first created, when the Frame and Position Markers are initially created from the video and neural data files (see [“How CinePlex Editor Creates Initial Project Files” on page A-67](#)), or when a DVT file is imported. It is not performed when a CPJ file is read, or when data from a NEX file is imported. Note that the timestamp shift that is performed automatically is equivalent to the shift than can be performed manually using the **Tools | Shift Marker Occurrences**.

Note that applying this correction can shift Markers to have a negative timestamp near the beginning of files. When this happens, the timestamps will be assigned the value of 0.

In addition to the correcting for the camera latency, an independent correction for the tracking latency can be applied, as discussed in the next section.

Note: As of CinePlex Editor version 1.2.0, these latency corrections are now enabled by default, with a default correction of 21 milliseconds. If data have been analyzed using previous versions of CinePlex Editor, the timestamp shifts after upgrading to version 1.2.0. To return to pre-version-1.2.0 behavior, you can disable the corrections by unchecking the checkboxes.

Note: When CinePlex is being used with Plexon's Recorder system, there was an issue with Recorder versions prior to 2.3.2 that could artificially increase this latency by up to 80 milliseconds. If using CinePlex Editor with Recorder, please

upgrade the version of Recorder to version 2.3.2 or later. Also, use a video latency correction of 33 milliseconds as discussed above.

Note: When CinePlex Editor is being used with Plexon's MAP System, leaving the MAP on overnight could result in excessive latency - much greater than 30 milliseconds. If the MAP has been left on overnight, it is better to reset the MAP System.

A.8 Aligning Tracker Coordinates to Frames with CinePlex System Version 2

Note: This section is not applicable when video files are recorded by CinePlex Studio V3 or later in conjunction with the pre-requisite versions of Rasputin (MAP systems) or PlexControl (OmniPlex Systems). In those cases, the corrections described in this section are not needed.

If neural and video data files are collected using a Plexon NDAQ and CinePlex Studio V2 with tracking enabled, then the temporal relationship between Frame markers, the arrival of strobe codes to the MAP digital input card, and video tracker coordinates are depicted in the following image of the Activity window:



Note: Note: the above screenshot depicts the timing assuming that the automatic corrections for (see previous section) are not enabled.

When the video frame is available, CinePlex Studio immediately timestamps the file and stores the time in the AVI file along with the video frame image. When CinePlex Editor initially reads the AVI file, the time for each frame becomes a **Frame Marker** time, which appears as the blue tick marks in the previous image.

After CinePlex Studio acquires the video frame, it feeds the video image to the tracking algorithm. Some time later, the tracking algorithm determines the tracking positions and CinePlex Studio encodes the tracking positions using the VideoTracker protocol and outputs a burst of strobed data words. The time between the frame timestamp and the sending of the strobe codes depends on how quickly the tracking algorithms finish, but the first strobed data word always occurs before the start of the next video frame. The words within a burst are clocked out at a constant rate every two milliseconds.

When strobed data words arrive at the MAP, the MAP timestamps them as it reads them in, and then stores them as events in the PLX file. When CinePlex Editor in turn reads these strobed events from the PLX file, they become occurrences of a Scalar marker named **Strobed**; in the preceding image, these occurrences appear as brown tick marks. Also, if CinePlex Editor recognizes that the strobed codes are in VideoTracker protocol, it decodes them into occurrences of one or more Coordinates markers (see [Section 3.2, “Marker Types” on page 22](#)). CinePlex Editor then assigns times to the Coordinate marker

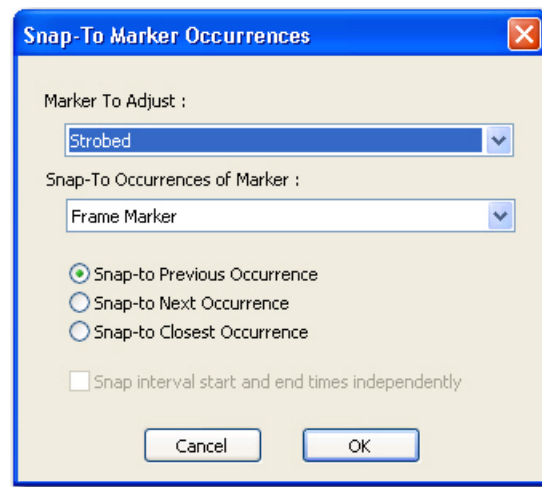
occurrences. The assigned times are derived from the time of the first strobed event in each burst of strobed events. As a result, CinePlex Editor assigns times to the tracked positions that are later than the timestamps of the corresponding video frames; in the preceding image, the tracked positions (**Position 1**) are the red tick marks and the video frames are the blue tick marks.

This time offset between the frame time and the tracking coordinates, although realistic, is not desirable in some cases. For example, you can simplify subsequent analysis when the coordinates corresponding to a video frame are equal to the time of the video frame. You can do this with CinePlex Editor, by using the Snap-To Marker Occurrences tool described in [“Snap-To Marker Occurrences” on page A-53](#).

To align frame times and tracking coordinates

- 1 To align the tracking coordinate *Position n* marker occurrences to video frames, on the **Tools** menu, click **Snap-To Marker Occurrences**.

The **Snap-To Marker Occurrences** dialog box opens.



- 2 Select the *Position n* marker in the **Marker To Adjust** box. Leave the **Snap-To Occurrences of Marker** set to the default value **Frame Marker**.
- 3 Click **Snap-to Previous Occurrence**.
- 4 Click **OK**. A confirmation box will appear that specifies how many marker occurrences were moved.

After the *Snap-to* operation completes, the previous image becomes:



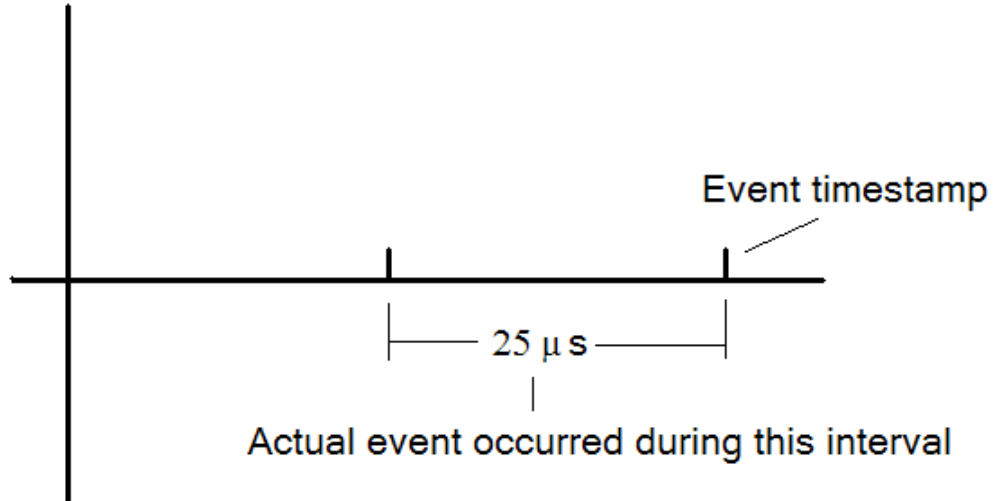
The red tick marks are now aligned with the blue tick marks. Thus, the tracker coordinate **Position 1** occurrences are now aligned with the **Frame Marker** occurrences.

Note that position data imported from a DVT file is already timestamped with the time of the corresponding frame, so this correction is not required.

You can configure CinePlex Editor to automatically perform this snap-to previous operation for newly-created projects by checking the ‘Automatically snap Position Markers imported from PLX files to the previous Frame Marker’ checkbox in the **Latency Correction** tab of the **Options** dialog box. This correction is only automatically applied when the data is initially imported from a PLX file.

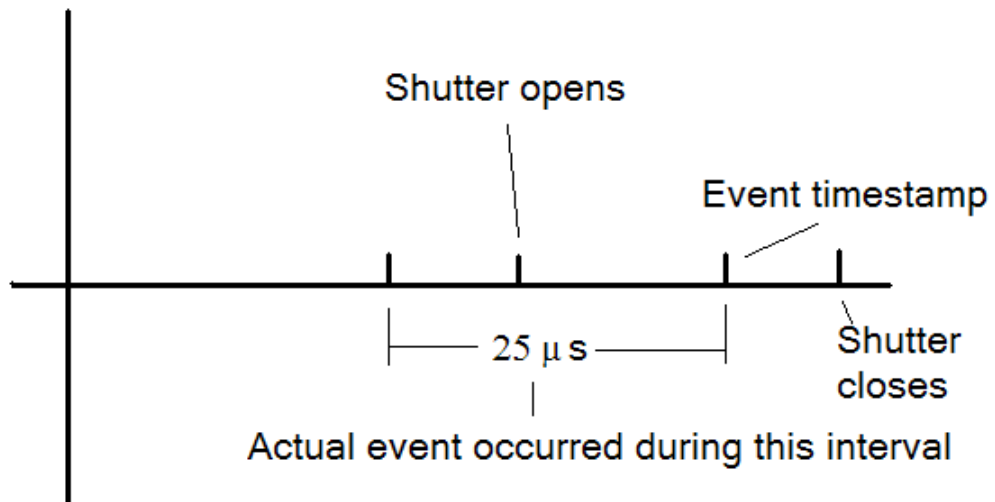
A.9 Interpreting Frame and Event Timestamps

An event timestamp indicates that the MAP detected the event within the prior 25 microseconds. This is illustrated by the diagram below.



A frame timestamp shows when the shutter was opened. The shutter will remain open until the exposure time elapses.

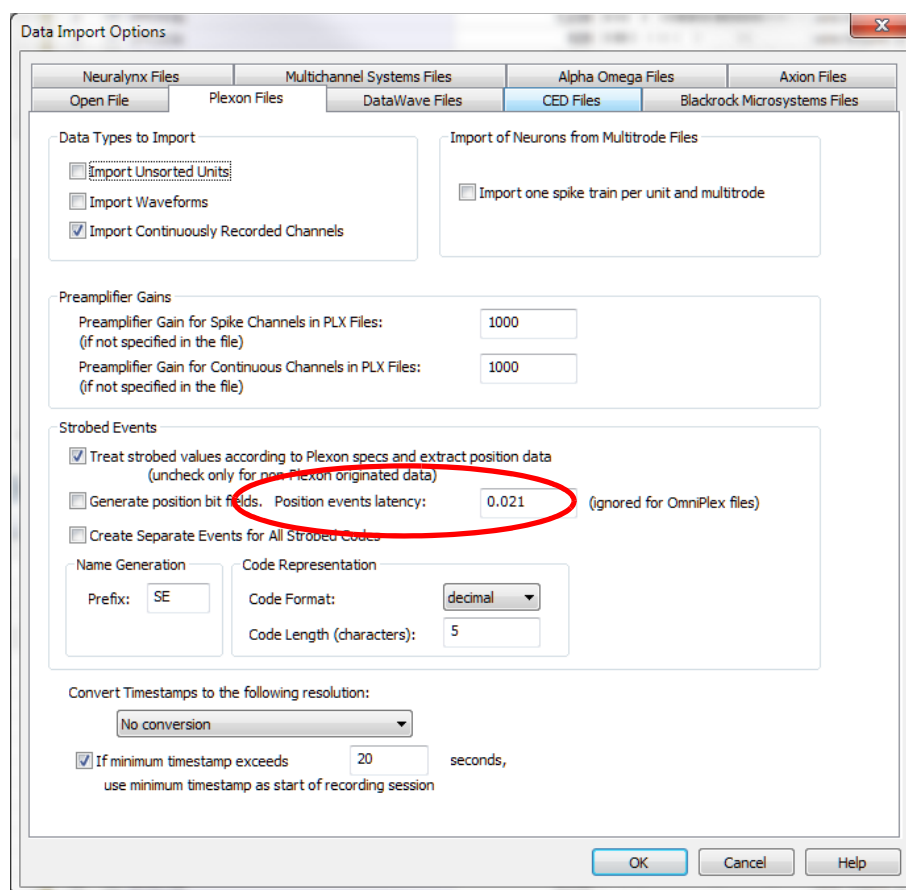
Note: If the shutter is opened within the 25 microseconds prior to an event timestamp, it is possible that the visual evidence of the event will not be captured as illustrated by the diagram below. Referring to the diagram, if the event occurred prior to the shutter opening, the visual evidence will not be recorded.



A.10 Analyzing CinePlex Studio (Version 2) Data with NeuroExplorer

As discussed in [“Export to NEX” on page A-36](#), data from CinePlex Studio V2 can be exported from CinePlex Editor as a NEX file and read into NeuroExplorer. In this case, CinePlex Editor can perform latency corrections as described in the previous sections, and the data read into NeuroExplorer will be already corrected for latency. There is no latency when video files are recorded by CinePlex Studio V3 or later in conjunction with the pre-requisite versions of Rasputin (MAP systems) or PlexControl (OmniPlex Systems). In those cases, no latency corrections are needed.

A PLX file containing coordinates from CinePlex Studio can also be read directly into NeuroExplorer. NeuroExplorer can decipher the Video Tracker protocol strobe codes and turn them into continuous variables. In this case, the timestamps for the coordinates should be corrected for latency within Neuroexplorer. Note that since NeuroExplorer does not have access to the frame times (stored in AVI and DVT files), it needs to compensate both for the video latency (see [“Correcting for Video Latency with CinePlex System Version 2” on page A-72](#)) and for the tracking latency (see [“Aligning Tracker Coordinates to Frames with CinePlex System Version 2” on page A-74](#)) by subtracting a larger number from the position timestamps. To configure the latency correction, from the **View** menu select **Data Import Options**. In the **Data Import Options** dialog box, click the **Plexon Files** tab. In the **Strobed Events** area, enter a latency value in the **Position events latency (seconds)** field.



The default value for this latency correction in the screenshot is 75 milliseconds (appropriate for the Plexon Video Tracker product, but too high for CinePlex Studio). A more appropriate number is 31 milliseconds (21 milliseconds video latency plus about 10 milliseconds of tracking latency).

Appendix B

Navigating the Plexon User Interface

B.1 Plexon User Interface	B-2
B.2 Screen Elements.....	B-2
B.3 Standard Menu Items and Dialogs	B-10
B.4 Customization	B-17

B Navigating the Plexon User Interface

B.1 Plexon User Interface

The Plexon[®] user interface embodies a standard look-and-feel for Plexon software products. To illustrate the underlying concepts behind the look-and-feel, this appendix uses screenshots from Plexon's CinePlex[®] Editor and CinePlex Studio applications. Although there will be differences in menus and toolbars between different applications, how to use, handle, and operate the user interface components will be fundamentally the same across generations of Plexon's software products including:

- CinePlex System
- CinePlex Editor
- OmniPlex[®] System
- Offline Sorter[™] System

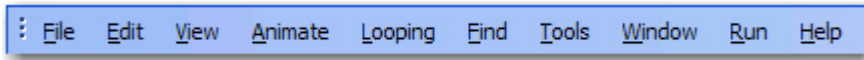
This appendix covers common functionality of the look-and-feel between different Plexon software applications. The discussion includes the following sections:

- Screen elements
- Standard menu items and dialogs
- Customization

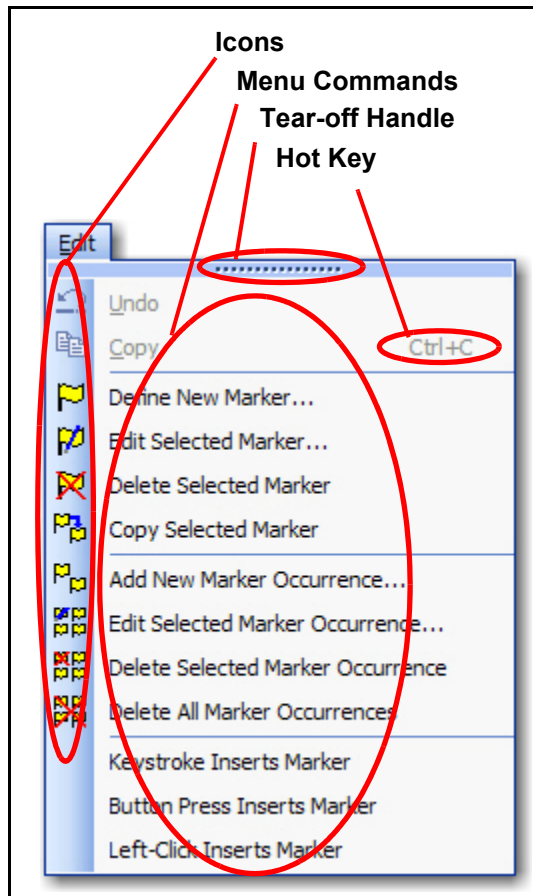
B.2 Screen Elements

B.2.1 Menus

The menu bar of the application contains the names of all of the menus for the application. Each menu name has a letter underlined which indicates the hot-key combination for that menu. To activate a particular menu, click the left mouse button on the name or press and hold the **ALT** key while pressing the underlined letter. The image below is the main menu of CinePlex Editor.



Each menu of the Plexon User Interface contain menu commands and may also contain Icons, Hot Keys and a Tear-off Menu Handle as shown by the illustration below of the Edit menu of CinePlex Editor.



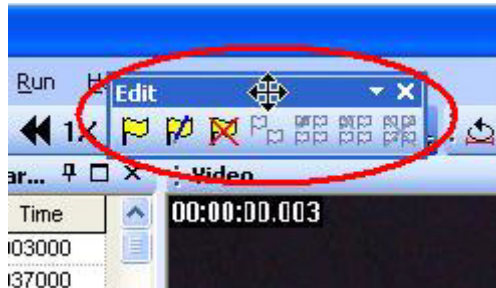
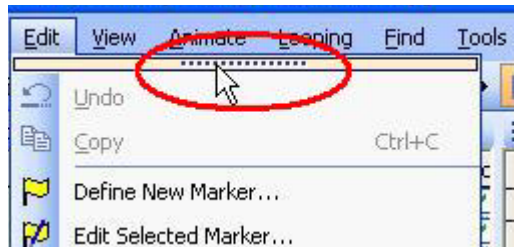
While all Plexon applications are shipped with their available menu commands organized into a set of menus, the contents of the menus can be customized and new menus can be created.

- **Icons** - Icons may be located immediately to the left of the menu commands. These icons will be displayed on the toolbar associated with the menu. In the example menu, there are icons associated with all but the last three of the menu commands. The presence of an icon next to a menu command means that the icon is also a label on a toolbar button and will execute the same command when clicked as the menu command on the menu.
- **Hot Keys** - Hot Keys are key combinations that will cause a menu command to execute without having to click the command on the menu. Typically, hot keys will contain two keys that must be pressed simultaneously for the combination to execute. The area at the far right of the menu commands may display the hot key combinations for the menu commands. In the example

B Navigating the Plexon User Interface

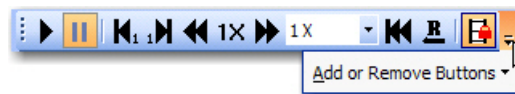
menu, there is a hot key combination (CTRL + C) for the Copy command. Hot keys may be added or customized via the **Tools-Customize** dialog.

- **Tear-off Menu Handle** - The Tear-off Menu Handle is an area (the one containing the dots) at the top of the menu, present on many menus. The tear-off feature allows the quick creation of a toolbar that contains all of the commands in the menu that have command icons. You can hover the mouse over the tool to highlight it, drag the mouse to the toolbar area and place the menu as a toolbar there. The illustrations below show highlighting the Tear-off Menu Handle to begin dragging the toolbar, dragging the toolbar across the screen, and finally docking the toolbar in place.

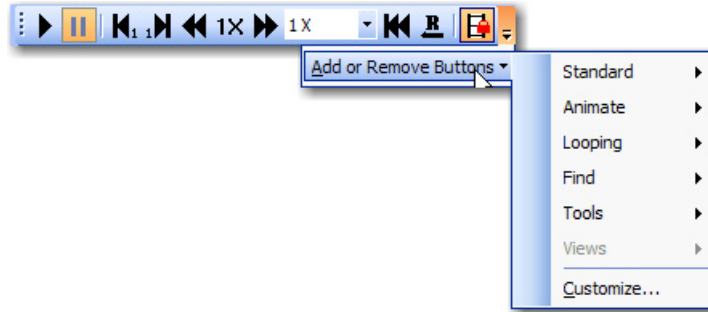


B.2.2 Toolbars

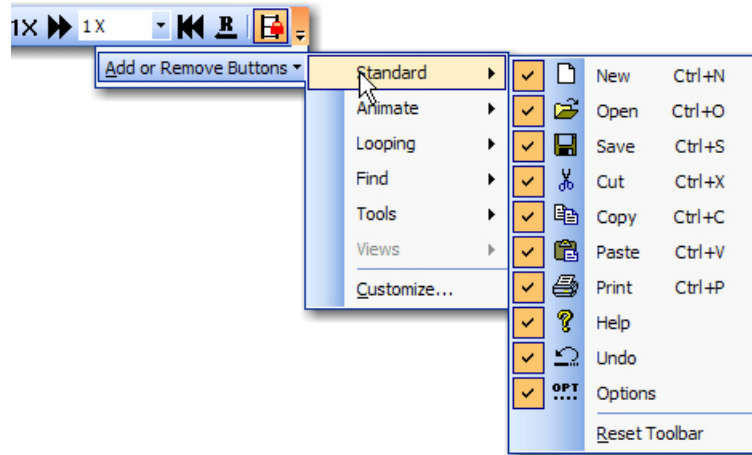
Each toolbar has a dropdown button at the right that will allow you to add or remove buttons from toolbars and will also allow you to access the **Customize** dialog box. When you click the dropdown button the **Add or Remove Buttons** dropdown menu will appear as shown below.



The dropdown menu also has a dropdown button. Clicking that button displays a menu list of the available toolbars and a menu command to allow access to the **Customize** dialog box.

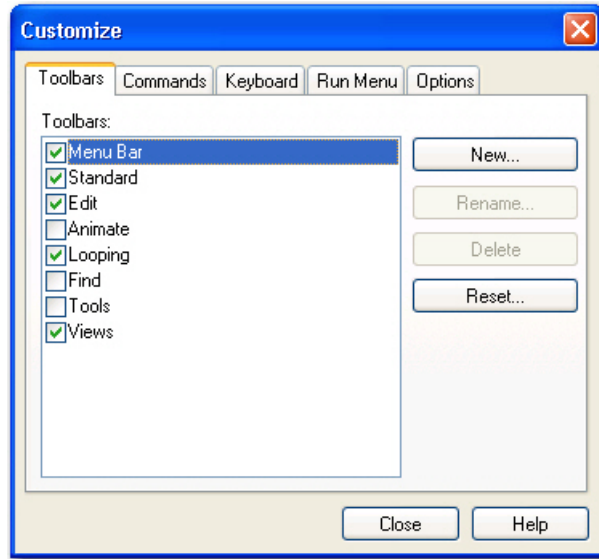


Expanding one of the toolbar menus will display all of the available toolbar buttons for that particular toolbar and a checkbox beside each one that will indicate whether or not the button is visible on the toolbar. There is also an option to reset the toolbar back to its factory default setting.



Clicking the **Customize** menu command will open the **Customize** dialog box. This dialog box is common to Plexon software applications but may have different content on the tabs according to the software application.

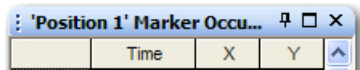
B Navigating the Plexon User Interface






For details on using the **Customize** dialog box, see [“Customization” on page B-17](#)

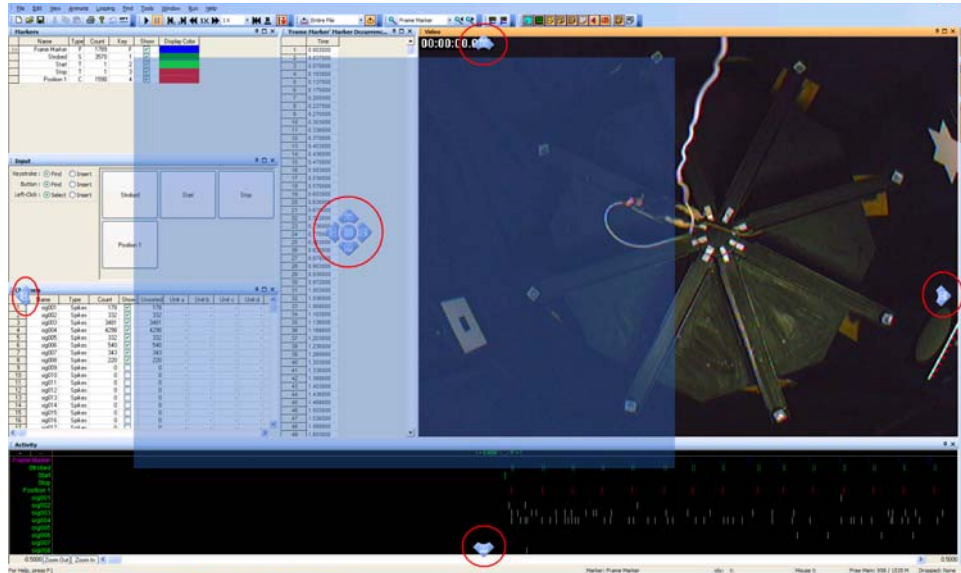
B.2.3 Windows

The image below shows a typical window title bar. It contains (from left to right) a **Title**, a **Auto Hide** button, a **Maximize** button, and a **Close** button.



- **Auto Hide Button**  - The **Auto Hide** button “pins” a window to the screen to keep it visible or “rolls up” a visible window into a tab. When the window is pinned, the **Auto Hide** button points in a vertical direction. If the window is rolled up, the **Auto Hide** button points in a horizontal direction.
- **Maximize Button**  - The **Maximize** button may not appear on all windows. It is the standard Windows[®] maximize button. Clicking the **Maximize** button on a window will maximize the original window and hide other windows occupying the same horizontal or vertical space. Clicking the **Maximize** button again will restore the previous layout. When clicked the image on the button toggles between one window and overlapping windows.
- **Close Button**  - The **Close** button closes the window.

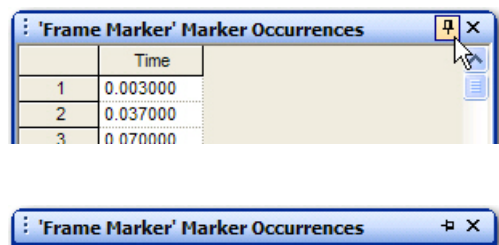
Plexon software applications often display several windows simultaneously. These windows may be resized by using standard resizing methods and may also be repositioned by dragging and dropping and by using **Docking Stickers**. The image below shows the repositioning of a window (denoted by the blue transparent rectangle) and various **Docking Stickers** (with red circles around them). These **Docking Stickers** allow you to dock the window being moved in one of several ways described below.



You can position a window by floating it, docking it at the desired docking sticker at a window edge or in a tab.

- **Floating a Window** - You can drag a window by the Caption Bar near the center of the screen and release it causing the window to float. Holding down the CTRL key while dragging will always float the window. Double-clicking on the Caption Bar will also float a window. Note that the size and position of the floating window is remembered.

— **Rolled-up Windows** - Floating windows may be enabled for roll up up by pressing the **Auto Hide** button. The window will roll up when the focus is changed to a different window. The first image below shows a floating window before rolling it up. The second image below shows the rolled-up window after the focus has changed.



B Navigating the Plexon User Interface

- **Docking a Window at the Application Frame** - When you begin to drag a window, a transparent blue rectangle appears to indicate the position of the window and the four **Docking Stickers** appear individually at each edge of the application frame to allow you to dock the window to the respective edge. To dock just move the mouse to the desired **Docking Sticker** and release the mouse button. The docked window will extend along the entire length of the edge to which it is docked. The image below shows all four screen **Docking Stickers**.



- **Docking a Window at a Window Edge** - When you move the window inside another window, the window **Docking Stickers** appear inside the window grouped together near the center of the window. Releasing the mouse button while it is over one of these stickers (except the center one) will dock the moving window to the respective edge of the window associated with the window **Docking Stickers**. The image below shows the window **Docking Stickers**. Note that the shading of these **Docking Stickers** is different that the shading of the **Docking Stickers** in the previous image.



- **Placing Windows into Tabs** - Releasing the mouse button over the center **Docking Sticker** will allow the moving window to occupy the same space as the window beneath and will create tabs along the bottom for switching the view between the two windows. The image below shows the Marker Occurrences window without sidebar tabs on the left. On the right, a Channels window has been placed into the same space by using the center docking sticker. Note that there are two sidebar tabs at the bottom of the window.

'Strobed' Marker Occurrences

	Time	Value
>1	0.007375	21903
2	0.009375	22972
3	0.041375	21903
4	0.043375	22972
5	0.074375	21903
6	0.076375	22972
7	0.107375	21903
8	0.109375	22972
9	0.140375	21903
10	0.142375	22975
11	0.176375	21903
12	0.178375	22975
13	0.207375	21903
14	0.209375	22975
15	0.240375	21903
16	0.242375	22975
17	0.279375	21903
18	0.281375	22975
19	0.307375	21903
20	0.309375	22975
21	0.340375	21903
22	0.342375	22975
23	0.374375	21903
24	0.376375	22975
25	0.407375	21903
26	0.409375	22975
27	0.440375	21903
28	0.442375	22974
29	0.474375	21903
30	0.476375	22974
31	0.507375	21903
32	0.509375	22972
33	0.540375	21903
34	0.542375	22972
35	0.574375	21903
36	0.576375	22972
37	0.609375	21903
38	0.611375	22972
39	0.640375	21903
40	0.642375	22972
41	0.674375	21903
42	0.676375	22972
43	0.712375	21903
44	0.714375	22972
45	0.740375	21903
46	0.742375	22972
47	0.774375	21903
48	0.776375	22972
49	0.807375	21903

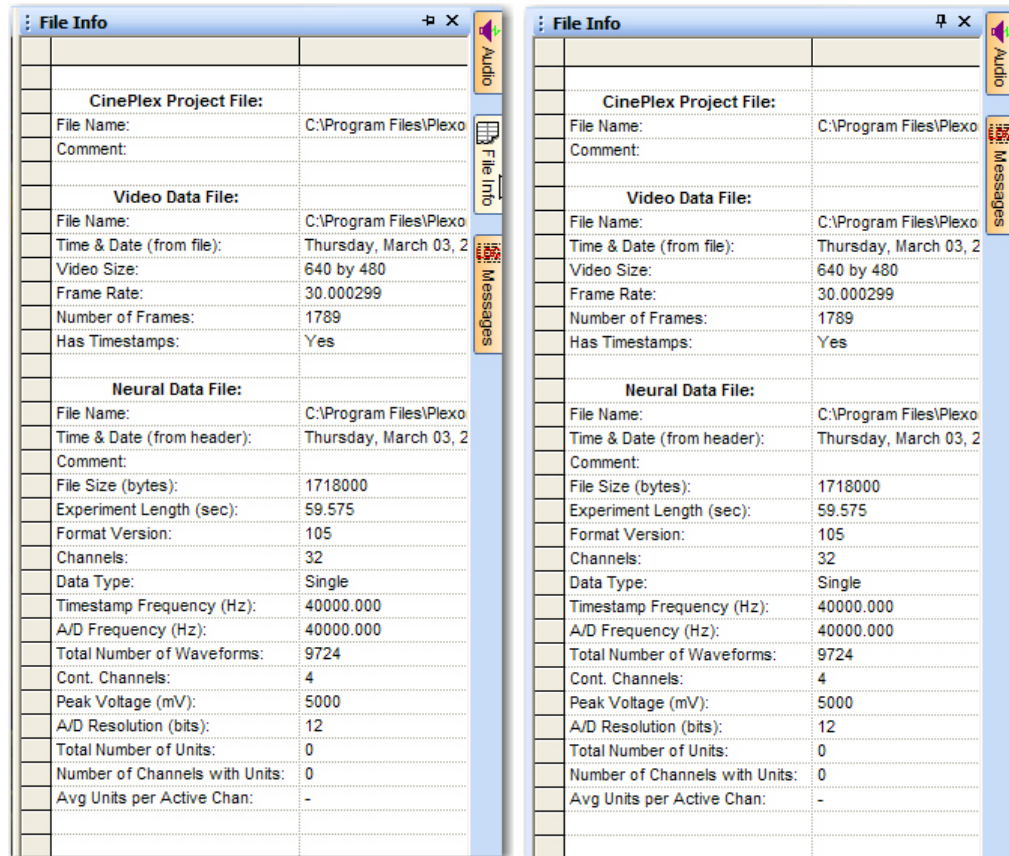
Channels

	Name	Type	Count	Show
1	sig001	Spikes	178	<input checked="" type="checkbox"/>
2	sig002	Spikes	332	<input checked="" type="checkbox"/>
3	sig003	Spikes	3481	<input checked="" type="checkbox"/>
4	sig004	Spikes	4298	<input checked="" type="checkbox"/>
5	sig005	Spikes	332	<input checked="" type="checkbox"/>
6	sig006	Spikes	540	<input checked="" type="checkbox"/>
7	sig007	Spikes	343	<input checked="" type="checkbox"/>
8	sig008	Spikes	220	<input checked="" type="checkbox"/>
9	sig009	Spikes	0	<input type="checkbox"/>
10	sig010	Spikes	0	<input type="checkbox"/>
11	sig011	Spikes	0	<input type="checkbox"/>
12	sig012	Spikes	0	<input type="checkbox"/>
13	sig013	Spikes	0	<input type="checkbox"/>
14	sig014	Spikes	0	<input type="checkbox"/>
15	sig015	Spikes	0	<input type="checkbox"/>
16	sig016	Spikes	0	<input type="checkbox"/>
17	sig017	Spikes	0	<input type="checkbox"/>
18	sig018	Spikes	0	<input type="checkbox"/>
19	sig019	Spikes	0	<input type="checkbox"/>
20	sig020	Spikes	0	<input type="checkbox"/>
21	sig021	Spikes	0	<input type="checkbox"/>
22	sig022	Spikes	0	<input type="checkbox"/>
23	sig023	Spikes	0	<input type="checkbox"/>
24	sig024	Spikes	0	<input type="checkbox"/>
25	sig025	Spikes	0	<input type="checkbox"/>
26	sig026	Spikes	0	<input type="checkbox"/>
27	sig027	Spikes	0	<input type="checkbox"/>
28	sig028	Spikes	0	<input type="checkbox"/>
29	sig029	Spikes	0	<input type="checkbox"/>
30	sig030	Spikes	0	<input type="checkbox"/>
31	sig031	Spikes	0	<input type="checkbox"/>
32	sig032	Spikes	0	<input type="checkbox"/>
33	AD01	Continuous	59448	<input type="checkbox"/>
34	AD02	Continuous	59448	<input type="checkbox"/>
35	AD03	Continuous	59448	<input type="checkbox"/>
36	AD04	Continuous	59448	<input type="checkbox"/>

- **Hidden Windows** - Docked windows whose access is not needed often can be hidden or “rolled up” by pressing the **Auto Hide** button. When hidden, the window is represented by a sidebar tab. Sidebar tabs may be located at the left, right, or bottom of the screen and indicate hidden windows. To show one of these windows, just hover the mouse over one of the tabs and the window will appear. The **File Info** window of CinePlex Editor opened by the sidebar tab is shown below on the left. If you click the **Auto Hide** control, the window will be pinned and remain

B Navigating the Plexon User Interface

open after you move the mouse away from the sidebar tab as shown on the right. The **Auto Hide** button will also have changed direction and be pointed downward. Note also that the **File Info** sidebar tab is gone on the right image.

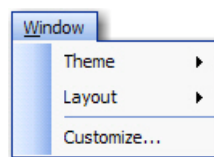


B.3 Standard Menu Items and Dialogs

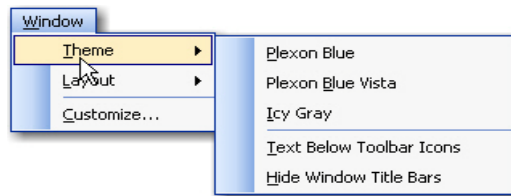
In Plexon software applications, some menu items may have the same functionality across several applications. These items are standard menu items and consist of the **Window** menu, the **Run** menu, and the **Help** menu.

B.3.1 Window Menu

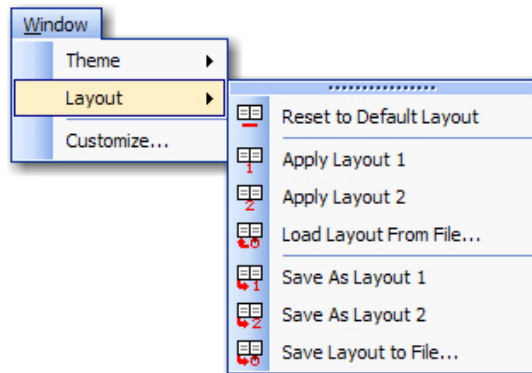
The **Window** menu contains three items: **Theme**, **Layout**, and **Customize**.



- **Theme** - Clicking on **Theme** displays a menu as shown below. A theme is a color scheme that is part of the look-and-feel of the user interface.



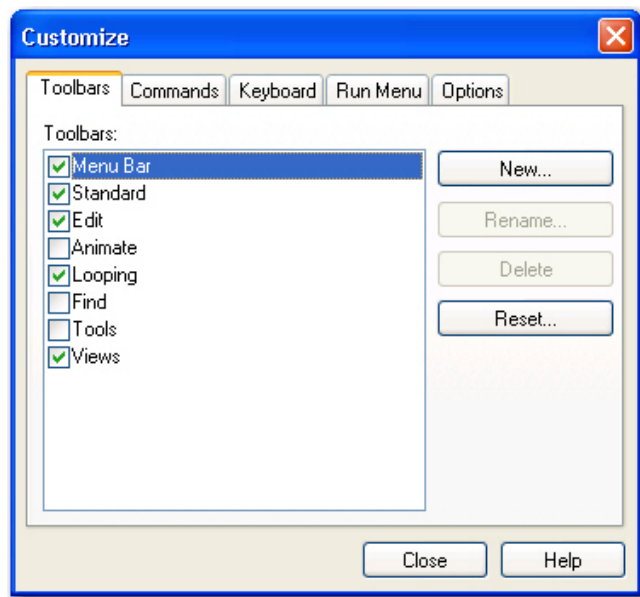
- **Theme Group** - The top group of items are theme toggle items that may be selected to apply to the user interface look-and-feel. Only one of the themes may be selected at a time.
- **Text Below Toolbar Icons** - This item is a toggle item to show or not show text below the toolbar icons.
- **Hide Window Title Bars** - This item is a toggle item to hide or show window title bars.
- **Layout** - Clicking on **Layout** displays a menu as shown below. A layout is the size and placement of the windows on the screen. It also remembers the number and placement of toolbars.



- **Reset to Default Layout** - Clicking on this item resets the layout to the factory default.
- **Load Layout Group** - Clicking on **Apply Layout 1** or **Apply Layout 2** applies one of the standard layouts to the user interface. Clicking on **Load Layout From File** will allow you to select a layout file to apply to the user interface.
- **Save Layout Group** - Clicking on **Save As Layout 1** or **Save As Layout 2** saves the current screen layout as one of the two standard layouts. You can also click **Save Layout to File** to save the current screen layout to a file that can be loaded by the **Load Layout From File** item.

B Navigating the Plexon User Interface

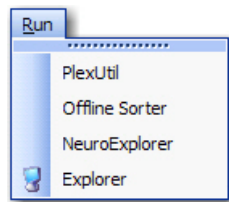
- **Customize** - Clicking **Customize** displays the **Customize** dialog box as shown below



For details on using the **Customize** dialog box, see [“Customization” on page B-17](#).

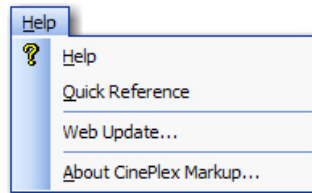
B.3.2 Run Menu

The purpose of the **Run** menu is to launch other applications quickly. The **Run** menu will be populated by default with some common Plexon applications. To launch other applications from within the current application, you can add new entries to the **Run** menu. A sample **Run** menu is shown below. For additional information about customizing the **Run** menu, see [“Run Menu Customization” on page B-20](#).

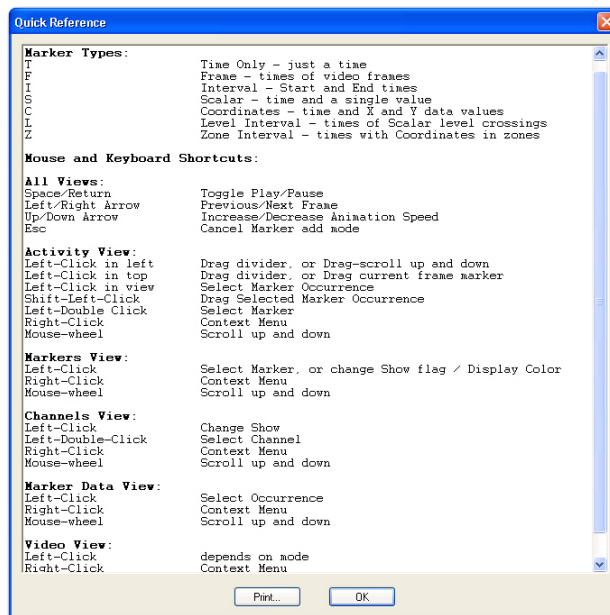


B.3.3 Help Menu

The **Help** menu contains four items: **Help**, **Quick Reference**, **Web Update**, and **About XXXXX** where **XXXXX** is the name of the application.

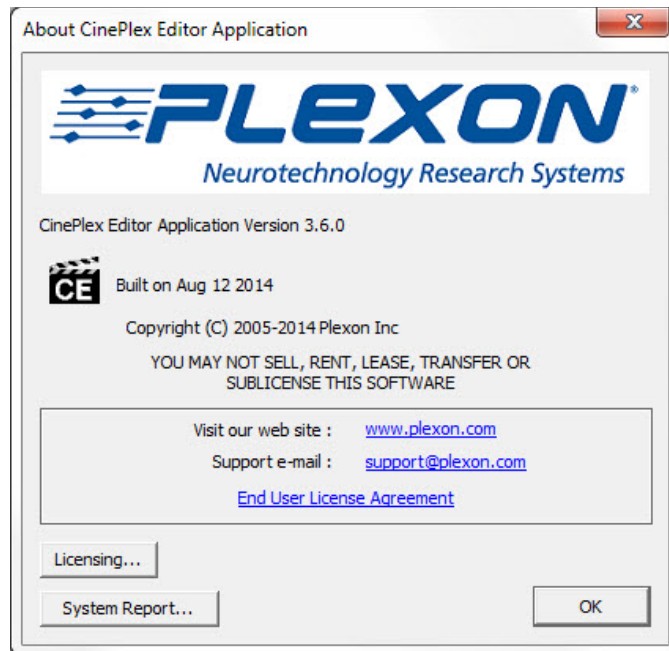


- **Help** - Clicking **Help** displays the User's Guide for the application.
- **Quick Reference** - Quick Reference may be missing in some applications. When present, clicking **Quick Reference** displays a dialog box similar to the one shown below. The purpose of the **Quick Reference** dialog box is to show keys and mouse buttons that control some of the commonly used functions in various views. You can print it by clicking **Print** or close it by clicking **OK**.

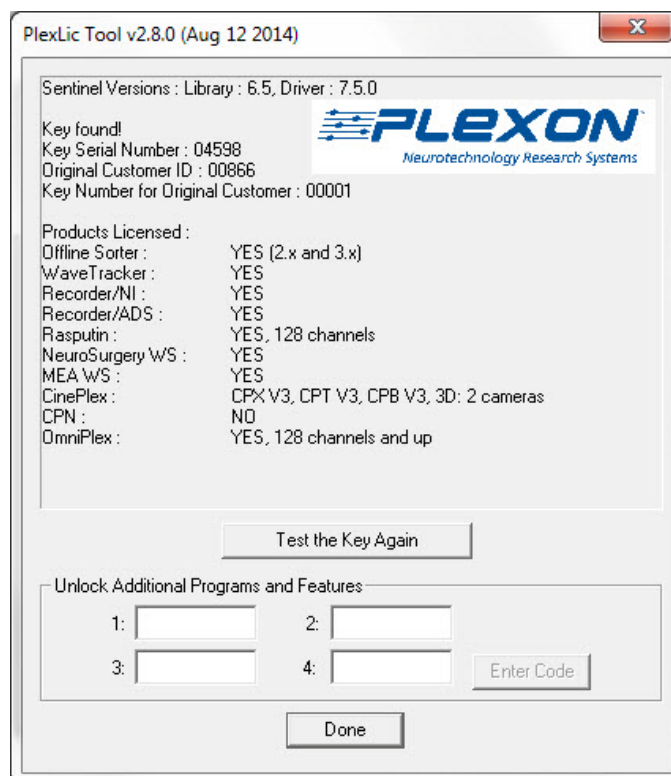


- **Print** – Click **Print** to print a copy of the Quick Reference.
- **Web Update** - This item allows you to update software via the internet. Clicking **Web Update** will first check to see if an update is available. If an update is available, it will be downloaded and installed.
- **About** - Clicking the **About** item displays the **About** dialog box. The text of the **About** item varies according to the application. The **About** dialog contains the version number and build data of the application, links to the Plexon website and support e-mail, and buttons for **Licensing**, **System Report**, and **Manage File Extensions**.

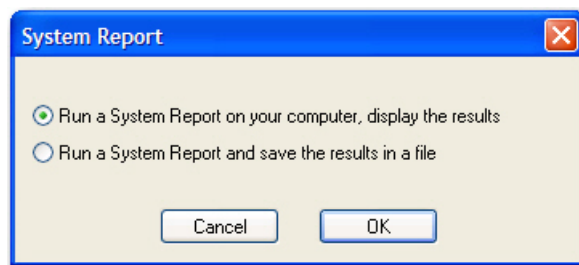
B Navigating the Plexon User Interface



- **Licensing** - Clicking the **Licensing** button displays the **Plexon License Management** dialog box. The **Plexon License Management** window includes the complete licensing information for Plexon products. The window includes the following three areas: information, key testing, and code entry.

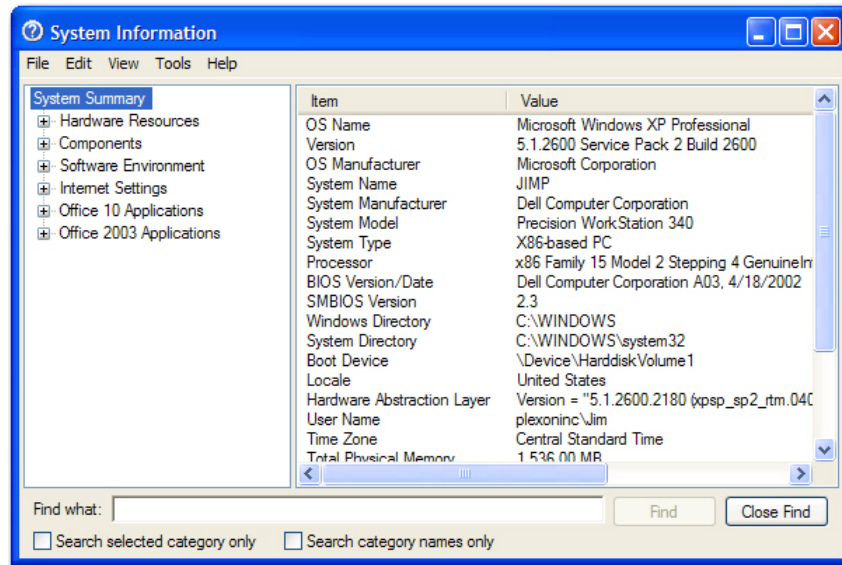


- The information area includes information on license keys and a list of all the Plexon products and their licensed status on this computer.
 - If you have moved or added a key, the **Test the Key Again** button provides a convenient tool to test license keys to ensure they function correctly.
 - If you have more than one key installed, the **Next Key>>** and **<<Prev Key** buttons appear. You may use these buttons to cycle through and test all keys.
 - The code entry area is used to enter the unlock codes for optional programs and features. If you have licensed optional items, instructions for entering codes and testing keys are included with Plexon installation programs.
- **System Report** - The purpose of the **System Report** button is to help Plexon Support diagnose problems by listing system information. Clicking the **System Report** button will first display a dialog box to allow you to display the system report on the monitor or save the report to a file that can be sent via E-mail to Plexon Support.



- After selecting a choice, clicking **OK** will launch the standard Microsoft® System Information tool. The image below shows the System Information report displayed on the monitor.

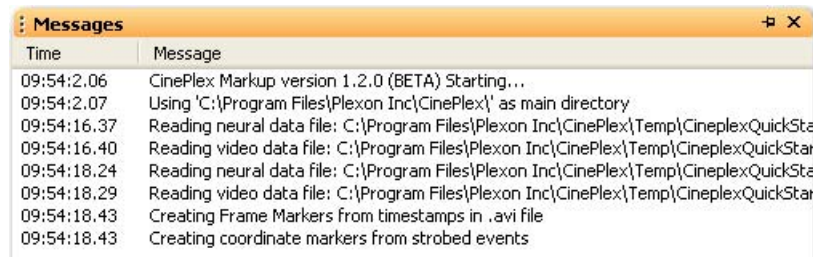
B Navigating the Plexon User Interface



B.3.4 Messages Window

The **Messages** window displays a log of timestamps and associated application events that Plexon Support can use for troubleshooting purposes.

Note: The Messages window is not available for all applications.



Right-clicking the mouse in the Messages window will display a right-click menu with the following items:

- **Erase** - This item clears the window of all messages
- **Pause** - This item stops the logging of messages
- **Show Debug Messages** - This item is a toggle to show or hide debug messages
- **Select and Copy All** - This item allows you to copy all of the messages to another application - such as a word processor
- **Save Log to File** - This item allows you to save the messages to a log file.
- **Mail Log to Plexon** - This item allows you to send the message log to Plexon for troubleshooting purposes

B.3.5 Right-click Menus

Most windows have right-click menus that control their behavior and options. To open a right-click menu, place the cursor inside a window and click and release the right mouse button. The right-click menu appears where the mouse is clicked. To select a menu item, move the cursor over it and click the left mouse button.

B.3.6 Current Selections

In grid-based windows, the currently selected item always appears with a >> or > in the left column of the appropriate grid-based window.

B.3.7 Undo

Plexon applications provide multiple *undo* levels. To undo an operation, on the **Edit** menu, click **Undo** or click the **Undo** button on the toolbar. You can undo operations that change the contents of the project file but may not undo operations that change the user interface options or colors.

B.4 Customization

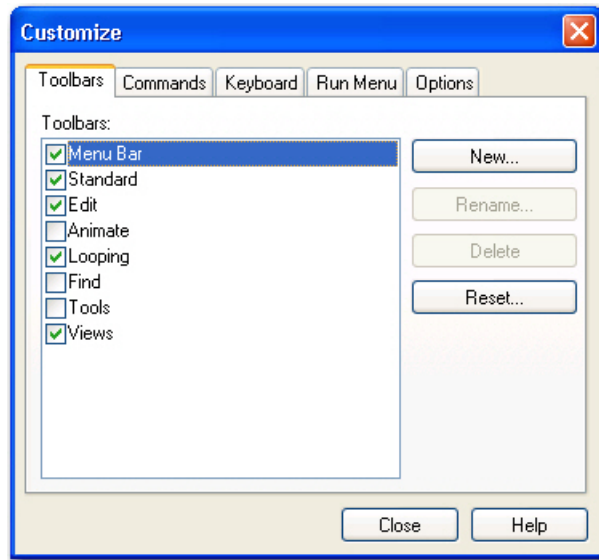
Although the menus and toolbars offer a rich set of commands and functions that should meet the needs of most Plexon customers, the **Customize** dialog box also allows you to customize several areas of the interface should the need ever arise. This section describes the uses of the **Customize** dialog box.

To open the **Customize** dialog box, from the **Tools** menu, select **Customize**. The **Customize** dialog box contains several tabs. The images below show the **Customize** dialog box from CinePlex Editor and displays five tabs - **Toolbars**, **Commands**, **Keyboard**, **Run Menu**, and **Options**. Although the content of the tabs will vary according to the application, the functional operation of each tab is respectively the same across all Plexon software applications.

B.4.1 Toolbars Customization

An image of the **Toolbars** tab follows:

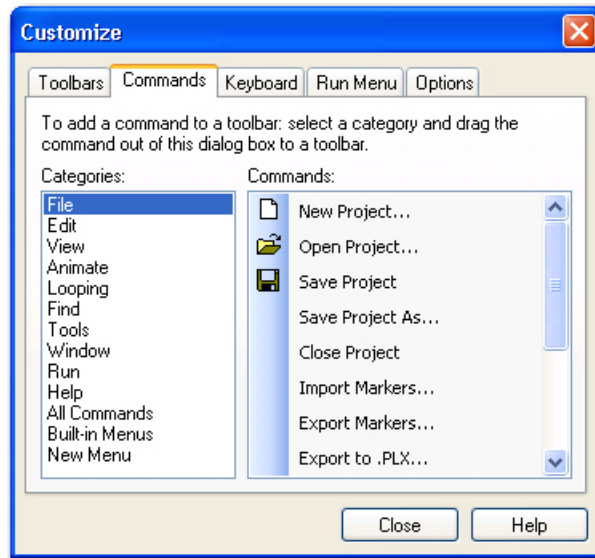
B Navigating the Plexon User Interface



- **Toolbars** - This box contains a list of the toolbars for the application. Click a toolbar checkbox to have it appear in the main application window.
- **New** - This button opens the **New Toolbar** dialog box. You can use this feature to create a custom toolbar for commands frequently used. Enter a toolbar name in the **Toolbar name** box.
- **Rename** - If you have selected a toolbar that was previously defined, click **Rename** to change the name of the toolbar. The **Rename Toolbar** dialog box displays.
- **Delete** - If you have defined a new toolbar and selected it, click **Delete** to remove that toolbar. There are no default values for newly defined toolbars. Standard toolbars may not be deleted. A confirmation dialog box displays.
- **Reset** - If you have selected a standard toolbar, click **Reset** to restore the toolbar to its default contents. If new buttons have been dragged to a toolbar, click **Reset** to restore the default version of the toolbar. A confirmation dialog box displays.

B.4.2 Commands Customization

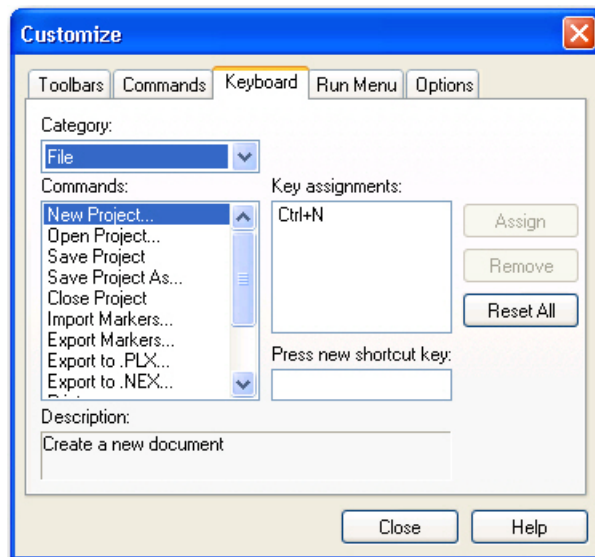
The **Commands** tab is used to customize which commands are available in toolbars. An image of the **Commands** tab follows:



- **Categories** - This is a list of all the toolbar categories. Select a toolbar category to see the buttons in the **Commands** area.
- **Commands** - This area shows all the buttons and the associated menu commands that belong to the selected category. You can select the desired command and drag it to the toolbar.

B.4.3 Keyboard Customization

The **Keyboard** tab allows you to bind keystrokes to commands. An image of the **Keyboard** tab follows:



- **Category** - This is a list of all the main menu headings. Select a menu heading to category to see the associated commands in the **Commands** area.

B Navigating the Plexon User Interface

- **Commands** - This is a list of all the commands associated with the selected main menu heading in the **Category** area.
- **Key assignments** - This displays the current key assignment for the command selected in the **Commands** area.
- **Press new shortcut key** - This allows you to enter a shortcut key combination for the command selected in the **Commands** area.
- **Description** - This area displays a description of the currently selected command in the **Commands** area.
- **Assign** - This button assigns the shortcut in the **Press New Shortcut Key** area to the selected command in the **Commands** area. If the shortcut key is already assigned to another command, a confirmation dialog box displays to allow or cancel the reassignment.
- **Remove** - This button removes the selected shortcut key in the **Key Assignments** area from the selected command in the **Commands** area.
- **Reset All** - This button removes all custom key assignments. A confirmation dialog box displays to allow or cancel the operation.

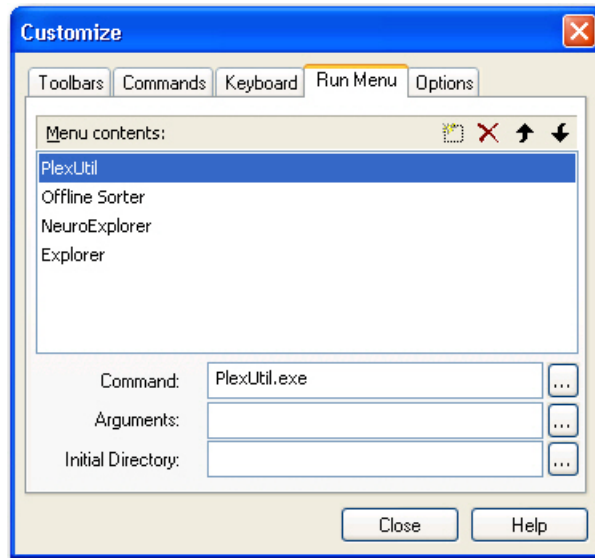
Procedure for Customizing Keystroke Shortcuts

- 1 From the **Window** menu, select **Customize**, and then click the **Keyboard** tab of the **Customize** dialog box.
- 2 Choose a category from the **Category** dropdown and from the **Commands** list, select the desired command to bind to a keystroke shortcut.
- 3 If there is already a key assignment listed in the **Key assignments** area, remove it by clicking the **Remove** button if so desired. You can also just reassign a new key combination to the selected command. (See Step 5)
- 4 Click the mouse in the **Press new shortcut key** area.
- 5 Click the **CTRL** or **ALT** key and hold it down while clicking another key. The dual key combination will be displayed in the **Press new shortcut key** area. This combination will be the key assignment for the selected command.
- 6 Click the **Assign** button to assign the key combination to the selected command. If there already is a key assignment for the command, a confirmation box will display to confirm or cancel the reassignment.

Note: In CinePlex Editor, do not bind menu operations to keystrokes that are associated with markers. Use only CTRL- or ALT- key combinations to bind to menu items, as these key combinations cannot be associated with markers.

B.4.4 Run Menu Customization

The **Run Menu** tab allows you to manage menu items on the **Run Menu**. An image of the **Run Menu** tab follows:



- **Menu contents** - This is a list of all the menu items in the **Run Menu**. Select an item to see its characteristics in the **Command**, **Arguments**, and **Initial Directory** areas.
- **Buttons** - The toolbar buttons allow you to add a new menu item, delete a selected menu item, move the selected menu item upward in the list, and move the selected menu item downward in the list.
- **Command** - This area contains the name of the file that runs when the menu item is selected from the **Run Menu**. The browse button opens the standard **Open** dialog box filtered for executable files.
- **Arguments** - This is a list of all the arguments to be passed to the file in the **Command** area, if any. The browse button opens the standard **Open** dialog box filtered for all files. When applicable, the symbol “%1” can be used to denote the current document.
- **Initial Directory** - This contains the path of the file in the **Command** area. The path allows the system to find the file and execute it. The Browse button opens the standard **Browse For Folder** dialog box.

Procedure for Customizing the Run Menu

- 1 From the **Window** menu, select **Customize**, and click the **Run Menu** tab.
- 2 To add a menu item, click the **New** icon, enter the command in the **Command** text box, enter any arguments in the **Arguments** text box, and set the applications directory in the **Initial Directory** text box. In each case use the appropriate **Browse** button at the right of the text box. The **Browse** button for the command opens the standard **File Open** dialog box filtered for executable files. The **Browse** button for the arguments opens the standard **File Open**

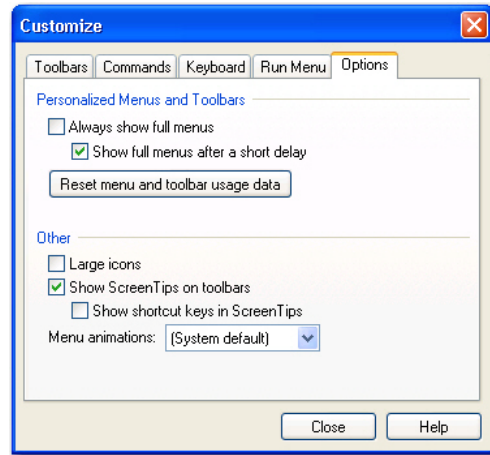
B Navigating the Plexon User Interface

dialog box filtered for all files. Then **Browse** button for the initial directory opens the **Browse for Folder** dialog box.

- 3 To delete a menu item, select it and click the **Delete** button.
- 4 To reorder the menu items, select a menu item and use the **Up** and/or **Down** arrow buttons to reorder.

B.4.5 Options Customization

An image of the **Options** tab follows:



- **Personalized Menus and Toolbars** - This area contains two check boxes and a button. The application will hide infrequently used menu items, but you may customize the display of menu items using these two checkboxes. If you check the **Always show full menus** checkbox, the application will always show full menus and the **Show full menus after a short delay** checkbox will be disabled. If you do not check the **Always show full menus** checkbox, there will be the option of checking or clearing the **Show full menus after a short delay** checkbox. The **Reset menu and toolbar usage data** button will allow you to delete the record of commands used in the application and restore the default set of visible commands to the menus and toolbars. A confirmation dialog displays.
- **Other** - This area contains three checkboxes and a dropdown list. If you check the **Large icons** checkbox, the application will use large icons on the toolbar. If you check the **Show Screentips on toolbars** checkbox there will be the option of checking the **Show shortcut keys in Screen Tips** checkbox. The **Menu animations** dropdown list allows you to select the type of animation to be used on menus that have animation.

Index

A

- Activity window
 - how to use [17](#)
- adding
 - marker occurrences [29](#)
- artifacts
 - in waveforms [65](#)

B

- behaviors
 - freezing, detection of [46](#)
 - headshaking [65](#)
 - of interest, denoting in video [64](#)

C

- Caution, Negate inverts your selection for the entire file [35](#)
- CinePlex files
 - project file, re-opening, example of [17](#)
- click-to-add mode
 - explanation & examples of [27](#)
- coordinate markers
 - entering & editing, overview of [40](#)
- coordinates
 - tracking, entering of [67](#)
 - tracking, repair of [68](#)
- copying
 - markers [29](#)
- current selections
 - indicators for [19](#)

- current time
 - indicator for [18](#)

D

- data
 - exporting, example of [15](#)
- defining markers [24](#)
- deleting
 - marker occurrences [31](#)
- display
 - Activity window
 - how to use [18](#)
 - customization of [18](#)

E

- editing
 - marker occurrences [30](#)
 - of marker occurrences [29](#)
 - of markers [29](#)
- events
 - external, representation of in .plx files [43](#)
 - in .plx files, event IDs for [43](#)
 - strobed, limitations in .plx files [44](#)
- Excel
 - exporting marker data to [41](#)
- exporting
 - marker data [41](#)

F

- F - in Activity window (See frame number)

- feature
 - in video, tracking of coordinates [67](#)
- files
 - PLX
 - exporting to [43](#)
 - text
 - exporting marker data to [41](#)
- finding marker occurrences [34](#)
- frame number
 - indicator in Activity window (F) [18](#)
- freezing
 - (See behaviors)

H

- headshaking [65](#)

I

- importing markers to existing project [41](#)
- interpolation of missing marker occurrences [38](#)
- Interval markers, operations with [35](#)

L

- Level Interval marker
 - definition of [56](#)
- Levels Editor
 - using [56](#)

M

- mapping
 - markers to event IDs in .plx files [43](#)
- marker occurrences [22](#)
 - addition of [29](#)
 - creating, example of [14](#)
 - deletion of [31](#)
 - editing of [29](#), [30](#)
 - finding, methods for [34](#)
 - in Activity window [39](#)
 - insertion by button method [26](#)
 - insertion by keystroke method [25](#)
 - insertion by left-click method [27](#)

- click-to-add mode, examples of [27](#)
 - insertion of, methods for [25](#)
 - missing, interpolation of [38](#)
 - operations with [34](#)
 - roughing in [64](#)
 - selecting & editing [39](#)
 - shifting of [36](#)
 - snap-to tool [37](#)
 - using, overview of [22](#)
- markers [22](#)
 - coordinate
 - entering & editing [40](#)
 - copying of [29](#)
 - defining [24](#)
 - defining new, example of [12](#)
 - editing of [29](#)
 - exporting, text, MATLAB, Excel [41](#)
 - importing to existing project [41](#)
- Interval
 - in .plx files, event IDs for [44](#)
 - operations with [35](#)
- Level Interval, defined [56](#)
- mapping to event IDs in .plx files [43](#)
- occurrences (See marker occurrences)
- Region Interval, use of [69](#)
- using, overview of [22](#)
- Zone Interval, definition [60](#)

- MATLAB
 - exporting marker data to [41](#)
- menus
 - shortcut, in windows [18](#)
- motion measure
 - thresholds for, use of

O

- operations
 - with Interval markers [35](#)
 - with marker occurrences, overview of [34](#)

P

- place cell analysis [69](#)
- PLX file
 - exporting to [43](#)

printing [64](#)

Q

quick-start example

- creating marker occurrences [14](#)

- defining a new marker [12](#)

- re-opening the project file [17](#)

- saving and exporting data [15](#)

- setting up the project [7](#)

- understanding the Main View [9](#)

- using the files [6](#)

R

repair

- of tracking occurrences [68](#)

S

selecting

- marker occurrences in Activity window [39](#)

selections

- current, indicators for [19](#)

shifting

- marker occurrences [36](#)

shortcut menus

- in windows [18](#)

snap-to

- marker occurrences [37](#)

strobe code [43](#)

T

time

- in Activity display

- indicator for [18](#)

time pointer

- in Activity window [18](#)

- in relation to video frame [18](#)

tools

- Interpolate Missing Occurrences

- use of [67](#)

tracking

- coordinates, entering of [67](#)

- missing data points, repair of [68](#)

triangle

- white triangle in Activity window [18](#)

U

undo [19](#)

V

video frame

- in relation to time pointer [18](#)

W

waveforms

- artifacts, headshaking [65](#)

- artifacts, invalidating [65](#)

window

- Activity, how to use [17](#)

windows

- Activity

- marker occurrences in [39](#)

- moving and docking in display [18](#)

- shortcut menus for [18](#)

Z

Zone Interval marker

- definition of [60](#)

Zones Editor

- using [60](#)

CinePlex[®] Editor

**A Component of the
CinePlex Behavioral Research System**

User Guide

Plexon Inc
6500 Greenville Avenue
Suite 700
Dallas, Texas 75206
Telephone: +1-214-369-4957
Fax: +1-214-369-1775

www.plexon.com

Copyright © 1983-2015 Plexon Inc, All Rights Reserved

Plexon Inc. Proprietary

Document Number: CPXMN0001d

Document status: Standard

Version: 3.6

Date: December 2015

Printed in the United States of America

